सत्यमेव जयते

भारत सरकार / Govt. of India
श्रम एवं रोजगार मंत्रालय
Ministry of Labour and Employment
खान सुरक्षा महानिदेशालय
Directorate General of Mines Safety

No. DGMS(S&T)/ (Approval) Circular No. 01 of 2017 /Dhanbad, Dated 10 / 03 /2017

To
The Owner, Agent and Manager of all Coal Mines

Subject: Approval of dust suppression/prevention devices fitted in drilling and boring equipment used in coal mines under regulation 123(6)(b)(ii) of Coal Mines Regulations' 1957.

At present, dust suppression/prevention devices, other than jet of water directed on the cutting edge to wet the cuttings, fitted in drilling and boring equipment for drilling or boring in stone on surface or belowground in coal mines are required to be approved by Chief Inspector of Mines under regulation 123(6)(b)(ii) of Coal Mines Regulations' 1957. A Gazette Notification was also issued in this regard vide GSR 24, published in the Gazette of India Part II Section 3(i) on 8 February 2014.

Based on the above notification, this Directorate has been approving such devices for use in coal mines by issue of special orders on case to case basis. Now, in order to bring further simplification in its approval, it has been decided that the subject matter may be brought under the domain of general approval. In view of this, a meeting was held on 04.7.2016 at DGMS (HQ), Dhanbad, for technical deliberations on the subject, in which experts from CIMFR, ISM, CMPDI and DGMS participated. After detailed deliberations, a draft standard for manufacturing, testing and use of dust suppression/prevention devices fitted in drilling and boring equipment used in coal mines was finalized, which was further discussed in the meetings of approval Committee of DGMS. Based on the above inputs, the standards and parameters for manufacturing, testing and use of such dust suppression/prevention devices are prescribed below:

1.0 General requirements

1.1 The dust suppression/prevention device or any part thereof fitted with drilling and boring equipment used in belowground coal mine shall not be made of alloy and metals likely to give incendive frictional sparks as required under Circular No. DGMS Tech. Circular no. 08 of 1974 or its revised version.

1.2 The flame proof and intrinsically safe features of electrical items of the dust suppression/prevention device to be used in belowground coal mines shall also conform to the standards specified in Circular No. DGMS Tech. Circular (Electrical), (Approval) no. 23 dated, 21.12.2015 or its revised version.

1.3 (a). The device shall be capable of suppressing/preventing the liberation or release of airborne dust while drilling or boring to such extent as to keep the concentration of respirable dust in the mine atmosphere within the permissible limit prescribed under regulation 123(2) of Coal Mines Regulations' 1957 or as amended from time to time.

(b). To ensure compliance of clause 1.3(a), amongst others, the dust survey shall be conducted with approved type of dust samplers as specified in regulation 123(2) of Coal Mines Regulations' 1957 or as amended from time to time. During such survey, the dust concentration shall be measured at the exit point of exhaust air of the dust suppression device, at the nearest point of drilling or boring where persons are required to be present and also at operator's normal working position (nose position), while the drilling or boring machine is in operation. The result of every such survey shall be recorded, signed and dated by the official carrying out the survey and the same shall be countersigned by the Manager.

(c). When result of the dust survey is found in excess of the permissible limit of dust concentration as stipulated under clause 1.3(a), the normal operation of the drilling or boring equipment shall be ceased and it shall not be resumed until the defect therein has been rectified and the requirements of Para 1.3(a) above has been found complied by conducting a dust survey in the manner specified under para 1.3(b) above. Every such incident shall be recorded in a book kept for the purpose and signed and dated by the official carrying out the survey and the same shall be countersigned by the Manager.

(d) Frequency of the dust survey: The dust survey shall be carried out in respect of every such drilling or boring equipment at the time of its first installation and thereafter at an interval of not exceeding one month as specified in clause 1.3.(b).

2.0 Testing of the dust suppression/prevention devices

Prototype Tests: At least one proto type sample of the device shall be subjected to tests by a test house prescribed under the para 6.0 of Approval policy, 2015(II Revision) of DGMS or its revised version, subject to the compliance of clause 1.3(a) of this general approval.

3.0 Marking

The following details shall be conspicuously marked on the body of the dust suppression / prevention device:

- Name of the manufacturer or registered trade mark;
- Date of its manufacturing and model;
- Additional marking required by the applicable industrial safety standards.

4.0 Manufacturer's Responsibilities

4.1 The manufacturer shall -

i. furnish all the relevant information in respect of specifications and certified copy of test reports or any other information pertinent to their product(s) to the user(s), along with each consignment;

ii. supply the certified drawing and specifications of the dust suppression/prevention device, which shall not be at variance with the prototype sample as mentioned in Para 2.0, to the user(s); and

iii. arrange to provide an instruction manual on the storage, maintenance, handling, installation and use of the dust suppression/prevention device to the user(s) along with each consignment.

4.2 The manufacturer shall supply to the user a copy of such valid certificates and test report(s) mentioned in the aforesaid Paras and also a compliance report against conditions mentioned in para No. 1.1 and 1.2 to facilitate use of the dust suppression/prevention devices with drilling or boring machines in the mine.

5.0 Responsibilities of Owner, Agent and Manager (User)

5.1 Before using the dust suppression/prevention device in drilling or boring machines in the mines, the user shall ensure that the device conforms to the above mentioned standards.

5.2 The user shall ensure that the manufacturer possesses adequate facilities for manufacturing and testing of the dust suppression/prevention devices.

5.3 The users shall obtain copies of all valid certificate(s) and test report(s) from the manufacturer while purchasing and before using the dust suppression/prevention device in drilling or boring machines in the mine.

5.4 The performance tests required under clause (a), (b), (c) and (d) of para 1.3 shall be the responsibility of the user.

5.5 The user shall ensure that the storage, maintenance, handling, installation and use of the dust suppression / prevention device are done as per the Manual / Operating instructions of the device.

6.0 Miscellaneous

6.1 The Chief Inspector of Mines or an Inspector of Mines may inspect, check and examine the manufacturing facilities of the dust suppression/prevention devices at any time and get samples tested during the course of inspection or send such samples for testing at any prescribed test houses/laboratories at the cost of the manufacturer.

6.2 The Chief Inspector of Mines or an Inspector of Mines may inspect, check and examine the dust suppression/prevention devices fitted in drilling or boring machines at any time in the mine and get samples tested during the course of inspection or send such samples for testing at any prescribed test houses/laboratories at the cost of Owner, Agent or Manager of the mine.

6.3 All users and the manufacturers shall be required to comply with this standard and any deviation or defects found in the product supplied or used in the mine, shall be brought to the notice of this Directorate.

6.4 The manufacturers, and the test houses, who are engaged for testing of such dust suppression/prevention devices, and the users shall adhere to the above mentioned standards and parameters while testing, before supplying and using the dust suppression/prevention devices fitted in drilling or boring machines in the mine.

7.0 The dust suppression/prevention devices fitted in drilling and boring equipment, with the standards, parameters and testing as mentioned above in this circular, shall be considered as approved by the Chief Inspector of Mines under regulation 123(6) (b) (ii) of the Coal Mines Regulations, 1957.

The dust suppression/prevention device having valid special approval by DGMS shall also be considered at par with those devices approved under this general approval for use in coal mines.

10/03/17

Chief Inspector of Mines

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Directorate General of Mines Safety

No. DGMS(S&T)/ (Tech.) Circular No. 01 of 2017 /Dhanbad, Dated 17/05/2017

To

The Owner, Agent and Manager of all Coal Mines

Sub: Strata monitoring in longwall workings in coal mines –reg.

Effective strata control is vital for safe and productive longwall operation in any geo-mining condition. Effectiveness of strata control can be evaluated by a suitable strata monitoring system. During operation of a longwall panel, a thorough investigation of the associated strata and support systems is required to understand the geo-mechanical behaviour of the strata and the performance of the support systems. This enables in effective tackling of the problems arising from strata and in ensuring safety of the men and machineries.

Monitoring of strata behaviour during extraction of longwall panel is not only required for ensuring safety and stability of longwall workings but also to get essential inputs for verification of existing design parameters of the panel, proper planning of future longwall panels, assessing suitable support requirements, etc. Therefore, it is felt that a standard protocol is required for strata monitoring in longwall workings.

In view of the above, a technical workshop was conducted on "latest trends in strata control in longwall mining with a special reference to strata monitoring techniques" on 20.1.2017 at DGMS, Dhanbad, which was attended by 57 participants from different stakeholders like mining industry, research & academic institutions and DGMS. Based on the inputs drawn from the deliberations made in the workshop, the following guidelines have been formulated for strata monitoring in longwall workings:

I. Strata monitoring plan

The Owner, Agent or Manager of every mine shall formulate and implement a strata monitoring plan for every longwall panel in the mine under the guidance of a scientific agency having expertise in this field. The plan shall contain:

i) proposed instrumentation scheme
ii) monitoring schedules,
iii) list of the persons engaged in implementation of the plan and their duties & responsibilities,

iv) formats for documentation and records of the readings of strata monitoring, and

v) Any other information related to strata monitoring.

II. The strata monitoring plan referred under Para I above, shall be prepared based on the geo-technical studies by a scientific agency having expertise in this field and every such plan, shall, inter alia, include:-

1.0 Monitoring of gate roadways

1.1 Roof to floor convergence of tail and main gate roadways shall be monitored on regular basis by convergence indicators, once at least in every shift up to a distance of atleast 40m from the face at an interval not exceeding 10m.

1.2 Load cells shall be installed in main gate and tailgate roadways up to a distance of minimum 40 m from the face at an interval not exceeding 10 m on hydraulic/friction props or with the roof bolts as the case may be. Readings of the load cells shall be recorded in every shift.

1.3 The convergence measurements as required under clause no. 1.1 and load cell readings as required under clause no. 1.2 above shall be taken simultaneously.

1.4 If roof bolts are used as roof supports in gate roadways, at least 2 to 3 instrumented roof bolts shall be installed in each gate roadway at strategic places to determine the loading pattern on the bolts.

1.5 Multi point extensometers/ Tell tales/Sonic probe extensometers shall be installed in main gate and tail gate roadways at an interval not exceeding 50m to monitor dilation/ bed separation in the roof strata. The instruments shall be constantly maintained in the gate roadways of the panel at least upto a distance of 400 m from the face.

2.0 Monitoring of vertical induced stresses (abutment stresses) in barrier/chain pillars and longwall pillar

2.1 To predict abutment stresses in longwall pillar under extraction, stress cells shall be installed in the longwall pillar ahead of the face from main gate and tail gate roadways at an interval of 100 m. The stress cells shall be constantly maintained in the longwall pillar at least upto a distance of 400m from the face. The first stress cell shall be installed at the expected main weighting position.

2.2 To monitor the stability of the barrier/chain pillars and predict magnitude and location of the abutment stresses in it, stress cells shall be installed in the barrier/chain pillars from main gate and tailgate roadways at an interval of 200 m up to a distance of minimum 400 m from the face. The first stress cells shall be installed at the expected main weighting position.

3.0 Monitoring of load and convergence of Powered Roof Supports (PRS)

3.1 Pressure in the gauges fitted in leg circuits of the Powered Roof Supports (PRS) at the face shall be recorded once at least in every shift.

3.2 If there is no automatic continuous monitoring system of leg closure of PRS, measurement of convergence (leg closure) of the PRS shall be carried out by tape measurements at least once in every shift during idle period and daily once in other cases.

3.3 If there are no automatic continuous monitoring system of leg pressure and leg closure of PRS, the load on and convergence of at least 10 PRS at strategic locations shall be continuously monitored with data loggers to understand the loading pattern on PRS and its response.

4.0 Progressive caving of strata in the goaf

To study progressive caving behaviour of roof strata in the goaf with face retreat, at least three (3) multi-point Borehole Extensometers shall be installed from the surface along the central line of the longwall panel at not more than 500 m interval. In case of presence of goaved-out workings in the overlying seams vertically above the longwall panel, the location and interval between such Extensometers may vary to the extent that may be required to avoid drilling of boreholes through such goaved-out workings.

5.0 Subsidence study

Subsidence survey and maintenance of its records shall be done as per the DGMS circular no 4 of 1988 or its revised version.

6.0 If the roof strata of a longwall panel has been categorised as cavable with substantial difficulty or cavable with extreme difficulty based on Caving Index, the following additional precautions shall also be taken in the panel;

6.1 Continuous monitoring of strata shall be done using micro-seismic monitoring system with geophones installed from the surface to analyse the possible time of failure and location of the failure zones within the roof strata.

6.2 Leg pressures and leg closures of Powered Roof Supports (PRS) shall be monitored continuously by using real time monitoring and automatic data acquisition and interpretation systems.

7.0 In the proximity of the geologically disturbed areas of a longwall panel, during development (drivage of gate roadways and set up gallery) and salvaging of longwall panels the strata monitoring shall be carried out as per the instrumentation scheme suggested by the scientific agency referred under para-I above.

8.0 For every longwall panel, suitable trigger action response plans shall be formulated and integrated with emergency initiated protocols.

9.0 **Plan:** A part plan of the longwall workings depicting strata monitoring instrumentation with suitable index, shall be kept and maintained in the office of the mine.

10.0 Supervision

In every longwall panel, strata monitoring plan shall be kept under the charge of an Assistant Manager holding 1st Class Manager's Certificate of Competency with relevant experience in longwall, who shall also be assisted with adequate number of trained supervisors and manpower.

The owners, Agents and Mangers of all coal mines having longwall workings are advised to ensure compliance with this circular.

17/05/17

(Prasanta Kumar Sarkar)
Director General of Mines Safety

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DGMS(Tech)(MAMID)Circular No. 02 of 2017 Dhanbad : 15/ 06 /2017

To

All Owner, Agent & Managers of Coal Mines.

Sir,

Subject : LOCK OUT & TAG OUT – Energy shut down procedures

In coal mines, about 3% of accidents were caused due to Electricity. Majority of these accidents were caused by unexpected energization or startup of machines / equipment or by uncontrolled release of energy. The electrical accidents can be prevented by proper Lock out / Tag out procedures. The philosophy of LOCK OUT/ TAG OUT – Energy shut down Procedures is as such, not new in our country and being followed in oil field installations of CAIRN INDIA and in cement industry (including mines) of reputed organizations.

Electrical Safety is observed in mines (as well as in other Industries) as per laid down Practices of Indian Standards / NEC and Provisions of Legislation of Indian Electricity Act, 2003 and Regulations of Central Electricity Authority Regulations, 2010. As such, the provisions made there under are adequately covering the requirements of safe work practices and thereby to eliminate risks associated in unsafe working methods on use of Electricity. However, when it comes to underground mines, the prescribed work permit procedure as per BIS: 5216 is not sufficiently followed for varied reasons. This is more so in the case of coal underground mines where the workforce at lower levels, generally, prefers simple methods of working and goes awry. For lack of working discipline, adequate monitoring and control, people tend to go in short cut methods and invite risks.

The Lock out and Tag out energy shutdown procedures could well be an answer, in case of our underground mines, bringing some changes to suit our conditions of working and without compromising on the philosophy of work permit procedures laid down by BIS under standard: 5216.

Philosophy: To perform a service and maintenance work on industrial equipment safely, you must understand the importance of energy control. A LOCKOUT is a method of preventing mishaps by keeping equipment from being accidently started or switched ON. This method can be used for disconnecting switches, circuit breakers, valves or other isolation mechanisms and to put them in safe / off position. It is physically an attachment of lock so that the equipment cannot be energized. In a TAGOUT, the energy isolating device is placed in safe position and a written warning is attached to it.

LOCKOUT means to physically neutralize all energies in a piece of equipment before beginning any maintenance or repair work. Lock out involves stopping all energy flows by turning off switches on supply lines. It also involves locking physically the switches and securing the machine, device or supply lines in a de-energised state.

TAGOUT means placing a warning tag or sign (TAGOUT device) on an energy isolating device, warning not to operate the machinery until the TAGOUT device is removed. The purpose is to alert other employees about the status of a machine or a system, why it has been taken out of service and identity of the individual who has applied the LOCKOUT.

Principles of practices:

These LOCKOUT and TAGOUT materials are to be supplied by the employer to their employees and the employer brings out a policy of answerability, accountability for all their acts / decisions taken during production, maintenance, servicing installation, dissembling of machines etc., which are generally, the areas where accidents take place in a work place.

- This Energy isolation and LOCKOUT / TAGOUT are to be carried out by trained employees who are also authorised to perform service or maintenance.
- Before applying LOCKOUT / TAGOUT, all employees who work in the affected area must be notified.
- The control of hazardous energy or sources is to be done according to a six step procedure.

Ground for shutdown: Before any equipment is turned off in order to lock or tag it out, It is required to know the types and amounts of energy that power it, the hazards of that energy and how that energy can be controlled.

Equipment shutdown: The OEM's recommended procedures by using operating controls shall be followed to shut the system down for the equipment so that no one is endangered during shutdown.

Equipment isolation:

(i) All energy isolating devices shall be installed so that the equipment is isolated from its energy sources.
(ii) All primary and secondary power supplies shall be isolated as well so as to avoid any back feeding of source of supply into the equipment under service / maintenance of job. No short cut methods are to be employed by just removing fuses and it shall be ensured a total disconnection of source of energy of power.

- ✓ The policy thus framed is required to be reviewed and updated as per the changing situations.

How to identify lockout situation:

- ➢ It is required to assess all processes, work activities and machinery and, where and when lockouts are needed to be identified.
- ➢ Maintenance work will be a major area where lockout needs are more. The Information may be through work place inspections, recommendations through ISO and Inspections by statutory authorities.
- ➢ Every machine, device or process that will require a lockout is to be listed. More than one lockout may be required for a single machine or system.

LOTO procedures

- ❖ Procedure should be in writing and communicated to all employees and departments concerned.
- ❖ They should include the Supervisors in the work areas.
- ❖ All lockouts are to be authorised by work permit.
- ❖ Lockout shall stay, if work is not competed at the end of the shift.
- ❖ Completed work is to be reported to the person in-charge for signing off the work permit.
- ❖ The procedures should identify person responsible for performing lockout, person responsible for ensuring the lockout properly, energy sources to be controlled in the lockout, location of control panels, power sources, special hazards, personnel protective equipment, step by step lockout procedure, testing procedure etc., to ensure that all energies are controlled safely.
- ❖ Step by step procedure for removing the lockout etc.,

Lockout material including key operated Locks, locking devices shall be sturdy for issuing to workers who service or maintain equipment. An identification tag must be securely attached to the lock. Each worker will be issued only one key. It is important that for their personal protection, each worker and /or for person working in or on a machine places his / her safety lock on the disconnecting switch. It is ensured that tags are used to spotlight the work in progress, giving details of work being done. Only when the work is completed and the work permit is signed off, each worker is allowed to remove his or her lock. The last lock to be removed should be that of a person supervising the lock out. This lockout should be the removed by the person in charge and this responsibility should not be delegated.

Requirements of Training

All workers performing lockouts and their supervisors must receive training. The training should address importance of lockouts, legal requirements of lockouts, safety and employer's policy, energy forms, hazards and procedures on administrative and work related that must be followed.

Lockout / Tagout: All energy isolating devices are to be locked, tagged or both according to recommended and framed safety LOCKOUT / TAGOUT procedures put in place as a policy. Only standardized devices supplied by the employer shall be used and they are not be used for anything else. If lock cannot be placed directly on the energy control, lockout devices can be used. When lockout is used, every other employee can also lockout a single energy isolating device by using multiple locks. For big jobs, lockout box can be used to maintain control over large number of padlocks and keys. The tags are to be used along with the locks by attaching them at same points as locks are placed or as close to it as possible. The Tags are to be filled completely and correctly.

How to control stored energy: The following steps are necessary to guard against stored energy left in the equipment after it has been isolated from its energy sources.

(i) Inspect the system to make sure all parts have stopped.
(ii) Install ground wires i.e. discharge rod connecting to earth.
(iii) In case of other sources as applicable, relieve trapped pressure, release tension on the springs or block the movement of spring driven parts, block or brace the parts that could fall because of gravity.

Equipment isolation verification

(i) The work areas where there is likelihood of causing danger should be free of personnel.
(ii) Verify that the main disconnecting switch cannot be moved to ON position.
(iii) Use a testing meter to check the switch that source of power is fully isolated.
(iv) Press all ON buttons and other activating controls on equipment itself to verify that the source is isolated.
(v) Shut off all machine controls when the testing is finished.

A clear well defined policy supported by administrative and control procedures and proper training is essential for lockouts to be effective. A systematic approach would be drawn to develop a lockout policy.

- ✓ The policy is required to identify lockout situations, to develop procedures, to train workers and to enforce as per the prescribed recommendations.
- ✓ The written lockout policy should make reference to Employer's general safety policy and reference to applicable statutes / laws. It should clearly outline responsibilities and refer to procedures to be followed. The policy should state employer's intent and commitment to protect the safety of personnel and equipment.
- ✓ The policy should identify all activities, machines, equipment and processes where lockout is required.
- ✓ Appropriate persons shall be made responsible for lockouts and to be ensured lockout are performed by authorised persons only.
- ✓ Procedures are to be framed for each lockout situation and training of those who perform lockouts is an important aspect of policy.

The importance of procedures, lockout errors such as the equipment is inoperable or too small to warrant a lockout etc., shall be brought out in methodology of training. The use and care of personal protective equipment, proper use of tools etc., shall be addressed in the training. In the training sessions, mock locks outs shall be conducted and tested, and refresher classes shall be provided periodically.

Enforcement and updating lockout policy

The Enforcement of policy will be effective, if persons responsible are indentified and accountable for lapses. The best way is to include in their job descriptions. The policy should also put emphasis on individuals' achievements for duly rewarding them where it resulted in productivity with high safety standards.

It is also required to review lockout procedures periodically and revise them in light of any problems that may have been identified. When change in a process or equipment, Lockout requirements also change and require Review and revision.

Yours faithfully,

15/06/17

(P.K. Sarkar)
Director General of Mines Safety

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DGMS(Tech)(MAMID)Circular No. 04 of 2017 Dhanbad : 16/06/2017

To

All Owner, Agent & Managers of Coal Mines

Subject : Providing Environmental Monitoring System in belowground coal mines.

Sir,

Of late there were incidences of fires in sealed off areas of underground coal mines which remained unnoticed till general body of air outside the area became contaminated with Methane, Carbon Monoxide, Hydrogen and other Hydrocarbons. In one such case the situation demanded withdrawal of persons from belowground workings and fighting of fire from surface by injecting/pouring Carbon Dioxide through boreholes, keeping main mechanical ventilator running at 25% of its normal water gauge. It was also inferred from the analysis of the air samples from the environment inside the sealed off area that series of explosions had taken place resulting increase of Hydrogen during distillation of coal. It is pertinent to note that any such hazardous situation could have caused disaster in the mine in case of firedamp or coal dust explosion, resulting huge loss of lives & properties.

In this regard your attention is drawn to the Recommendation of 7th National Conference on Safety in Mines wherein it was suggested to provide necessary facilities for continuous type monitoring of the environmental parameters in respect of combustible and toxic gases in belowground coal mine workings in gassy seam of third degree and other coal mines having active underground fire. Noticing increasing trend of incidences of fire in coal mines; 8th, 9th, 10th & 11th Conference on Safety in Mines carried forward the said Recommendation.

This Directorate, through DGMS (Tech) Circular No. 08 of 2012 dated 23.03.2012, expressed concern for not abiding by the above-mentioned recommendation.

While taking stock of the situation as regard to installation of Environmental Monitoring System in gassy seam of third degree and fiery coal seams, after a series of fire in coal mines, it was noted that progress made toward the recommendation was minimal. It was further revealed that had such continuous monitoring system been installed in degree three coal seams/fiery coal seams, detection of fire in early stage could have been possible and preventive action could have been taken.

Therefore, all concerned are requested to initiate procurement of approved Environmental Monitoring System immediately for all belowground coal mine workings in third degree gassy seams & fiery coal seams.

Yours faithfully,

16/06/17

(P.K. Sarkar)
Director General of Mines Safety

भारत सरकार/Government of India
श्रम एवं रोजगार मंत्रालय/Ministry of Labour & Employment
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No. DGMS(Tech) Circular No. 14 of 2020 Dhanbad dated : 24 /12/2020

To
The Owner, Agent and Manager
All Coal and Non-coal Mines

Subject: Precautions against premature blast of Site Mixed Emulsion (SME) / Site Mixed Slurry (SMS) explosive.

Recently, in a fatal accident, occurred in an opencast coal mine, four persons were fatally injured and three received serious injuries due to premature detonation of Site Mixed Emulsion (SME) explosive column during charging in large diameter hole, drilled in a boulder.

(A) The detail inquiry conducted to find out the cause and circumstances attending the accident revealed the following:

- (i) Large diameter (150mm) holes, 0.7-1.0m in depth, were drilled in some boulders, measuring about 1.5m X 2.0m X 2.0m – 2.0m X 3.0m X 3.0m at an angle varying from about 40^0-45^0 from horizontal for fragmenting.
- (ii) The primer [cast booster (weighing 100 gms) and NONEL] could not go of its own at the bottom of holes, drilled in boulders.
- (iii) The mouth/collar of hole in boulder, being charged with SME explosive, was situated at a height of about 1.5-1.7m from ground level. Seven work persons, who were charging the hole, had to hold the hose pipe, carrying SME, above their shoulder because of it's heavy weight. The process itself was very tedious; as such it was an unsafe practice.
- (iv) The hazards associated with the handling and use of explosive including Site Mixed Emulsion (SME) explosive were not identified and their risk were not assessed and addressed in Safety Management Plan.
- (v) No Standard Operating Procedure (SOP) for handling and use of explosive including Site Mixed Emulsion (SME) explosive was framed.
- (vi) Training on handling and use of explosive including Site Mixed Emulsion (SME) explosive, was not imparted to persons employed in the mine for the purpose.

(B) Premature detonation of SME explosive column (non-cap sensitive explosive) was not possible without initiation of detonator of NONEL which was inserted into cast booster (altogether called primer). Thus sufficient shock, transmitted to primer, must have caused the explosive column (SME) to explode accidentally. One or combination of the following reasons must have created shock to NONEL to initiate the explosive column:

(i) The primer was placed at the mouth/collar of hole (1.0m in depth and inclined at 40^0-45^0 from horizontal) drilled in boulder as it did not move inside the hole by its own weight (100gms) because of inclination of the hole. When SMS explosive was poured at a speed of about 2.5kgs/sec, explosive (SME) column alongwith primer collided at the back of hole at high speed. This impact might have created sufficient shock to the detonator and cast booster for initiation, thus exploding the whole explosive column.

(ii) During the process of manufacturing the non-electric (NONEL) detonators, there have been several incidents of tube initiation, both in our country and overseas, occurring when the tube has broken under tension. This tendency to SNAP, SLAP and SHOOT has also been experienced in the field as well.

In an incident, a work person was attempting to remove a signal tube (NONEL) detonator from a hole when it got jammed. The worker pulled hard on the tubing, causing it to break. As the tube broke, the work persons noticed a spark at the hole collar and the detonator fired in the hole. Fortunately the bulk of the explosive had already been removed from the hole and the worker was not seriously injured.

In this particular case, there might have been undue tension in NONEL shock tube causing its breakage and created a SNAP, SLAP and SHOOT situation which ultimately caused unintended initiation of the shock tube resulting explosion of the explosive column.

(iii) The Mercury Fluminate (highly sensitive) is sometime used instead of Lead Azide (less sensitive) to manufacture NONEL shock tube to cut cost (Mercury Fluminate is cheaper than that of Lead Azide). In such case, there might have been chance of accidental detonation due to small shock as well which might had been received due to the above mentioned reasons.

(C) In order to avoid recurrence of such incidence in future, all concern are requested to take following precautions,

(i) Fragmentation of boulders by blasting shall be avoided. Rock breaker or other similar device shall be used for breaking the boulder. If it is, at all necessary to carry out blasting in boulder, large diameter holes shall not be drilled in it for the purpose. Instead, in such cases small diameter (32mm) holes shall be drilled and blasted by small diameter explosive cartridges in small quantity.

(ii) Simultaneous blasting of charged holes in benched and that in boulders shall not be done.

(iii) Standard Operating Procedure (SOP) for handling and use of explosives including SME explosive shall be framed on the basis of assessed risk.

(iv) The amount of electrostatic charge generated and stored in conductive shoes & nylon socks, synthetic clothes etc. are unknown. If sufficient amount of electrostatic charge is stored, it may also cause premature initiation due to sudden release charge and causing spark. Thus the persons engaged in charging/stemming operation shall be refrain from wearing such conductive shoes/clothing/socks etc. during the said operations.

(v) The inclination of deep hole to be drilled (whenever necessary to do so) shall be such that the primer (detonator in NONEL inserted into cast booster) could be lowered at the bottom of hole easily with gravity.

(vi) Drilling and charging operations shall not be done simultaneously in a place. Before charging operations, the area shall be fenced. No heavy earth moving machinery shall be deployed in the area till blasting is completed and area is declared safe by an official of the mine.

(vii) The main composition of NONEL shock tube shall be verified from the manufacturer. If required, necessary testing shall be done from an authorized laboratory for the purpose. In no case the shock tube containing highly sensitive explosive (like Mercury Fluminate) shall be used for blasting.

(viii) All initiating devices like shock tube detonators shall be used on 'first in first out' basis. Older the material, greater the risk in usage. All the shock tube detonators must be carefully examined for any physical damage and spillage of powders outside the metallic shells.

(ix) In no case, the primer shall be placed in collar/mouth of deep hole and pushed it in the bottom of the hole alongwith SME/SMS explosive column. Rather the primer shall be gentle lowered by gravity at the bottom of hole. When it is ensured that the primer reached at bottom of hole, the charging of SME/SMS shall be started.

(x) Minimum number of persons shall be employed for charging and stemming of deep holes. The unsafe practice of holding the hose pipe, carrying SME/SMS explosive, above ground level by persons engaged in charging shall be eliminated.

(xi) If the weather condition before and during blasting operation is such as to cause thundering and lightening, the blasting operations shall be immediately suspended and precautions suggested through DGMS Circular No. 10 of 2020 dated 23.06.2020 shall be followed.

(xii) While conducting blasting in fire area/hot strata, the precautions mentioned in DGMS Circular (Tech) No. 2 of 1985 and No. 2 of 1990 shall be taken.

(xiii) Drilling in misfire shots may be another reason for accidental detonation. In order to eliminate such incidence, the guidelines mentioned in DGMS Circular (Tech) No. 2 of 1983 and No. 10 of 2001 shall be followed in addition to the statute provided for the purpose.

(xiv) All other guidelines on blasting operation, issued by DGMS from time to time in the form of circular, shall be followed.

I am sure that observance of the aforementioned precautions shall go a long way in preventing recurrence of such incidence in future.

24.12.2020
(प्रभात कुमार)
खान सुरक्षा महानिदेशक एवं
मुख्य खान निरीक्षक

भारत सरकार
Government of India
श्रम एवं रोजगार मंत्रालय
Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय
Directorate General of Mines Safety

No. DGMS (Tech) Circular (MAMID)/ 01

Dhanbad, dated : 06/05/2015

To

The Owner, Agent and Manager of all Mines

Subject : Accidents/incidences due to exposure to high atmospheric temperature.

Sir,

During peak summer every year, many incidences of mine-workers getting exposed to high atmospheric temperature get reported. Some such cases had turned into fatalities. Opencast mines during summer are most vulnerable in this regard. In some cases, persons got affected due to heat in underground mines also, where ventilation was inadequate. Inquiries revealed that in most of the cases "Heat Stroke" was the major contributory cause. Heat stroke generally occurs when the body stops adjusting to the hot temperature by sweating, and can't keep up with the heat. It is characterized by hot, dry, red skin that is warm or hot to touch and immediate medical attention is needed in such cases. The other heat related disorders could be,

Heat Exhaustion

Heat exhaustion is caused by loss of large amounts of fluid from the body. A worker with heat exhaustion continues to sweat, but their body can't keep up with the heat. The worker may have a headache, fatigue, or flu like symptoms. In most cases the worker needs to rest, cool down, and drink plenty of fluid.

Heat Cramps

Workers may suffer from cramps and painful muscle spasms. This happens when workers drink water to replace the fluids they lose from sweating, but don't replace the body's loss of salt. Drinking fluids with electrolyte replacement ingredients are recommended in such cases.

Heat Syncope

Heat syncope is a fainting episode or dizziness that usually occurs with prolonged standing or sudden rising from a sitting or lying position. Factors that may contribute to heat syncope include dehydration and lack of acclimatization.

Heat Rash

Heat rash is a skin irritation caused by excessive sweating during hot, humid weather.

Neurological Effects

Excessive heat may also lower mental alertness and ability to work. Workers in extreme environments may make more mistakes and may have more injuries.

Contributing Causes

Heat can increase the risk of suffering from other illnesses and health problems.

The following precautions will go a long way in overcoming such incidences/accidents,

1. Slowing down the pace of work should be allowed, especially if the worker feels even slight heat strain,
2. Rest areas should be located as near to the workplace as practicable,
3. Ensure that adequate quantity of cool water and electrolyte supplements are easily available,
4. In really hot conditions, workers should drink at least a glass of water every 15-20 minutes,
5. Different schedules may be negotiated to let workers do the hardest work during the coolest parts of the day,
6. Rest timings may be re-scheduled to avoid work during high/extremely hot temperatures. Where this is not possible, a two-person crew should be assigned to perform work during extremely hot temperatures,
7. Ensure that worker do not enter/work in an atmosphere having no ventilation or inadequate ventilation in underground mines,
8. Workers must be made aware of the dangers from excessive heat and humidity and remedial measures.

Yours faithfully,

6.5.15
(Rahul Guha)
Director General of Mines Safety

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Directorate General of Mines Safety

No. DGMS (Tech) Circular (MAMID)/02 Dhanbad, dated : 07/05/2015

To

The Owner, Agent and Manager of all Mines

Subject: Accidents due to wheeled trackless machinery during 2014.

Sir,

At present, wheeled trackless transportation machineries like dumpers/tippers (henceforth 'dumpers' only) are used by mine operators widely in Open Cast mines. While increase in production of coal is a primary objective of the mine management, at the same time it has to ensure the safety and welfare of its workers. The coal mines in India need to use these machines in a judicious way to meet these two important goals. It is observed that during 2014, 13 accidents occurred due to dumpers out of a total of 64 fatal accidents. A detailed analysis of these fatal accidents revealed the following,

(i) During 2014, 67 persons were killed in coal mines as a result of 64 fatal accidents,
(ii) Out of these 64 accidents, 13 accidents involving 14 fatalities happened due to dumpers,
(iii) Majority of accidents occurred either at the haul road or at stock yard,
(iv) 8 operators, 3 fitters, 1 mechanic, 1 deputy supervisor and 1 tipper helper were victims,
(v) Out of 14, 11 were regular workers and 3 worked under contractors,
(vi) In some cases, mechanical fault of dumpers resulted into accidents indicating that the management was not vigilant enough to check the condition of dumpers before operating it,
(vii) One of the sub-causes was identified as movement of dumper in reverse direction indicating the failure of the dumper driver/supervisory staff/ management to ensure the safety and security of the workers in the vicinity and possibly non-functioning of the audio-visual reversing alarm. In a case, where a contractual light vehicle operator aged 22 years had died, it was revealed that the accident occurred while restarting a breakdown loaded dumper on the mine haul road. The dumper was moved in reverse direction mistakenly, hitting a contractual jeep driver standing behind it,
(viii) A case had been identified where the driver of the dumper was not wearing the seat belt,

(ix) In one case a loaded dumper with overburden material was travelling down on an unconsolidated ramp which was under preparation in an opencast coal mine. Due to this activity, the dumper fell into a sump to a depth of about 17m due to sliding of the ramp, submerging the operator cabin in sludge/water. The operator died due to drowning. Thus, if the dumper had not been allowed to operate in an unconsolidated ramp, the life of the dumper operator could have been saved.

The above mentioned analysis is brought to the notice of all concerned so that valuable lessons are learnt and similar incidents are avoided in future. I, once again reiterate the need of the following precautions among others in operation of dumpers in Open Cast mines of the country,

(i) Ensure that dumpers are fit to operate in all respects before it is engaged in mines,
(ii) Ensure that the path of the moving/standing dumper remains clear from objects/individuals,
(iii) Ensure that the alarm systems of the dumper are in working condition,
(iv) Ensure that the dumper operators use seat belt while operating the same,
(v) Ensure that the dumpers are not overburdened due to unmanageable load of material.

Yours faithfully,

7.5.15
(Rahul Guha)
Director General of Mines Safety

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Directorate General of Mines Safety

No. DGMS (Tech) Circular (MAMID)/ 03   Dhanbad, dated: 29 / 06 /2015

To

The Owner, Agent and Manager of Coal Mines

Subject: Accidents due to 'roof fall' during 2014.

Sir,

One of the major causes of accidents in underground coal mines is 'roof fall'. In the past, DGMS had issued several guidelines on the subject of 'roof fall'. While mine managements have taken considerable initiatives to reduce the risk of such accidents, but a real time analysis of incidents indicates that the industry as a whole has a long way to go to achieve 'zero incidents' in this area. It is observed that during 2014, 9 fatal accidents at coal mines occurred due to 'roof fall' out of a total of 64 fatal accidents. A detailed analysis of these fatal accidents revealed the following,

(i) During 2014, 67 persons were killed in coal mines as a result of 64 fatal accidents,
(ii) Out of these 64 accidents, 9 accidents (i.e. 14 percent) involving 10 fatalities happened due to 'roof fall' in the coal mines,
(iii) 3 face workers, 3 dressers, 2 support personnel, 1 contractor's workman and 1 mazdoor were the victims,
(iv) 55 percent (i.e. 5 out of 9) accidents due to 'roof fall' occurred while dressing freshly exposed roof,
(v) In most of the cases, the freshly exposed roof were not supported according to Systematic Support Rules,
(vi) In one of the cases, the person had entered beneath freshly exposed unsupported roof without the permission of a competent person/official, thereby endangering his own life.

The above analysis is brought to the notice of all concerned so that lessons are learnt and similar incidents are avoided in future. I, once again, reiterate the need of the following precautions to be taken in underground coal mines by ensuring that,

(i) Risk due to strata control has been assessed and included in Safety Management Plan,
(ii) Safe operating procedure has been prepared on the basis of risk assessed,
(iii) Only trained persons employed in dressing of freshly exposed roof,
(iv) Strict compliance to the Systematic Support Rule under Regulation 108 of the Coal Mines Regulations, 1957,
(v) Training and re-training of workers on a regular basis,
(vi) Discipline at work place is maintained so that indiscipline does not lead to loss of any valuable life,
(vii) Nobody is allowed to work below unsupported roof.

Yours faithfully,

29.6.15
(Rahul Guha)
Director General of Mines Safety

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सत्यमेव जयते

No. DGMS (Tech) Circular (MAMID)/ 04 Dhandbad, dated : 15 / 07 /2015

To

The Owner, Agent and Manager of all Mines

Subject: Effective utilization of Health & Safety Management System in mines

Sir,

DGMS has taken initiatives to bring down accidents in Indian mines to improve mine safety and health and a fresh look into mine safety & health management system. These initiatives helped in bringing down fatal and serious injuries considerably over the years. However, when we refer the accident figures of 2014, it is apparent that much needs to be done. It has been observed that during 2014, 84 fatal accidents occurred in Coal mines, 30 in Non-Coal mines and 5 in Oil mines. During the same year 2014, it has been observed that 421 serious injuries were reported in Coal mines, 33 in Non-Coal mines and 9 in Oil mines. These numbers are not acceptable at all. It is essential that Mine operators should adopt more effectively safety and health management programs, or re-examine their existing programs to better manage safety and health, eliminate hazards, and prevent injuries and illnesses.

We would like to reiterate that an effective and successful safety & health management program must include as its core components the following six areas:

(1) Management commitment;
(2) Workers involvement;
(3) Workplace inspection to identify hazards and violations of mandatory health and safety standards;
(4) Hazard prevention and control;
(5) Safety and health training; and
(6) Program evaluation.

During evaluation of the current safety scenario, it was repeatedly a concern amongst stakeholders at grassroots level, that the miners are not actively engaged in the health and safety management programs. We need to remember that spontaneous participation of the mine workers will definitely give our initiatives towards better safety & health a quantum leap. Some steps in this regard could be,

- Encouraging the use of safety and health committees;
- Reviewing near-miss accidents with miners;
- Setting benchmarks for injury and illness reduction and regularly evaluating progress;
- Fostering effective communication at all levels;
- Providing education along with training;
- Creating adaptive and responsive approaches to finding and fixing hazards;
- Holding regularly scheduled safety meetings; and
- Empowering miners.

As we all work together to achieve the goal of "zero harm", we strongly encourage all concerned to re-look into our present health & safety management systems in mines and strengthen the present systems keeping the above mentioned core-components in mind. This will have considerable impact in ensuring that our miners come home safe after toiling hard each day at the mines.

15.7.15
(Rahul Guha)
Director General of Mines Safety

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Directorate General of Mines Safety

No. DGMS (Tech) Circular (MAMID)/05 Dhanbad, dated: 23 / 07 /2015

To

The Owner, Agent and Manager of Non-Coal Mines

Subject: Accidents due to 'fall of persons from height/into depth' during 2014.

Sir,

One of the major causes of accidents in non-coal mines is 'fall of persons from height/in to depth'. In the past, DGMS had issued several guidelines on the subject of 'fall of persons from height/into depth'. While mine management have taken considerable initiatives to reduce the risk of such accidents, but a real time analysis of incidents indicates that the mining industry as a whole has to go a long way to achieve 'zero incidents' in this area. It is observed that during 2014, out of total 36 fatal accidents in non-coal mines, 7 occurred due to 'fall of persons from height/into depth'. A detailed analysis of these fatal accidents revealed the following,

(i) During 2014, 38 persons were killed in non-coal mines as a result of 36 fatal accidents,
(ii) Out of these 36 accidents, 7 accidents involving 7 fatalities happened due to 'fall of persons from height/into depth',
(iii) In 57 percent cases, the casualties occurred due to slipping from side/edge of working of the mine,
(iv) 1 assistant rigman, 1 non-statutory supervisor, 2 loaders & 3 mazdoors were the victims. All victims were regular employees,
(v) In one of the cases, the victim fell from a height of 7.58 meters while walking at the top of a bench. Enquiry into the accident revealed that the victim was talking over mobile phone while walking endangering his valuable life.

The above mentioned analysis is brought to the notice of all concerned so that valuable lessons are learnt and similar incidents are avoided in future. I, once again reiterate the need of the following precautions to prevent accidents due fall of persons from height/in to depth in mines by ensuring the following,

(i) That the sides of the opencast working is kept benched, sloped and secured whilst working the mines so as to prevent danger from fall of sides,
(ii) That suitably anchored safety belts are worn while working at height,

(iii) That the persons are not allowed to work at any place/edge of working from where they are likely to slip or overbalance to fall, unless they are secured by safety belt/full body harness, suitably anchored to prevent them from falling,

(iv) That the steps, made on the slope for carrying load, are in accordance with the norms prescribed in the Metalliferous Mines Regulation, 1961,

(v) That the road or a footpath of prescribed width, having steps of prescribed dimensions are equipped with hand rails or ladders with hand rails and platforms at intervals not exceeding 10m are provided in the mines to allow safe travel of persons, to and from their working places,

(vi) That the use of mobile phones is restricted in the working area so that no valuable life is lost due to mobile phone induced absent mindedness,

(vii) That proper lighting arrangements are provided in the mines, as required under provision of Regulation 146(1)(a) of the Metalliferous Mines Regulations, 1961.

Yours faithfully,

23.7.15

(Rahul Guha)
Director General of Mines Safety

GOVERNMENT OF INDIA
MINISTRY OF LABOUR & EMPLOYMENT
DIRECTORATE GENERAL OF MINES SAFETY

DGMS (Tech.) Circular No. 06 of 2015 **Dhanbad, Dated 29/09/15**

To

All Owners, Agents and Mangers of Mines

Subject: Arrangements and facilities for occupational health surveillance of persons employed in mines.

Sir,

The 39th meeting of the Standing Committee on Safety in Coal Mines was held on 13.03.2015 under the Chairmanship of Hon'ble Minister of State (I/C) Coal at New Delhi. In the meeting, among others, concerns were raised about the poor arrangements prevailing in PME Centers of the coal companies. It was highlighted that none of the hospitals / PME Centers of coal companies were properly equipped with pneumoconiosis detection kits, which might lead to the cases of pneumoconiosis being mistakenly diagnosed as tuberculosis. It was also stressed in the meeting that protocol and guidelines should be given for rehabilitation of pneumoconiosis patients.

Needless to say, pneumoconiosis is a preventable but incurable disease. As mining is a dust prone industry, it is imperative on part of the mine managements to see that all suitable measures for prevention of dust generation and for proper health surveillance of the persons employed in mines are given utmost priority and importance.

Several guidelines and directives relating to occupational health surveillance in mines, including conduct of Initial and Periodical Medical Examinations for early detection of pneumoconiosis, silicosis and other occupational diseases; training of medical officers in occupational health and for use of standard ILO chest radiograph for classification of pneumoconiosis and silicosis; measures to be taken for prevention of such diseases and rehabilitation of affected persons; and for the equipments and other arrangements to be provided in PME Centers; have already been issued by DGMS time to time through circulars, such as DGMS Circular (Tech.) Nos. 1/1989, 4/1992, 2/1994, 3/2000, 4 & 5 of 2007, 1/2008, 1/2010, 3/2011, 5/2011 and 3/2012.

The Owners, Agents and Managers of all Mines are, therefore, requested to review their occupational health surveillance facilities with reference to the above guidelines to identify the gaps and take necessary measures to strengthen such facilities. They are also requested to make a system of undertaking such reviews periodically for continual improvement.

23.9.15
(Rahul Guha)
Director General of Mines Safety

सत्यमेव जयते

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Directorate General of Mines Safety
धनबाद / Dhanbad – 826 001

DGMS (Tech)(S&T) Circular No. 07 of 2015 Dhanbad, dated 23/09/ 2015.

To,
The Owners, Agents and Managers of all mines.

Subject: **Application for Medical Re-examination by Appellate Medical Board, constituted under Rule 29 K of the Mines Rules, 1955 .**

It is being observed that many applications of Appellants for Medical Re-examination by Appellate Medical Board constituted under Rule 29K of the Mines Rules, 1955, are not being forwarded in accordance with the procedure specified in Rule 29J of the Mines Rules, 1955. Many applications are being forwarded by the officials other than the manager of mine, as defined in Rule 2(f) of the Mines Rules, 1955 to the Convenor, Appellate Medical Board, Directorate General of Mines Safety, Dhanbad.

The procedure for Appeal for re-examination by Appellate Medical Board constituted under the Rule 29K of Mines Rules, 1955, is as follows:

(1) A person has been declared **unfit** for employment in mines or in particular category of mines or in any specified operations in mine as a result of an Initial Medical Examination or Periodical Medical Examination under 29B of mines rules.1955, he/ she within thirty days of the receipt of a copy of Form-O, may file an appeal with **Manager of mine**, as defined in Rule 2(f) of the Mines Rules,1955, requesting him to forward the appeal to an Appellate Medical Board constituted under rule 29K of Mines Rules, 1955. The Appeal shall be signed by the appellant (in case of illiterate left thumb impression), Date of Appeal, Name of appellant and his/her complete address with pincode shall be mentioned on the appeal.

(2) Within 30 days of receipt of appeal, the appeal shall be forwarded by the **Manager of mine** to Convenor, Appellate Medical Board, Directorate General of Mines Safety, Dhanbad-826001, Jharkhand. Letter no. with date, Name of the manager of mine,

name of the mine, complete address with pincode shall be mentioned on the forwarding letter.

(3) The manager of mine shall ensure that application shall be accompanied by;

(a) A legible certified copy of medical certificate in Form- O issued under Rule 29F(2) of the Mines Rules, 1955. The signature & stamp of manager of mine shall be on the certified copy of Form-O.

(b) The appeal of appellant in original.

(4) Letter without a pincode is not accepted by the Post-Office. Therefore, application submitted without a pincode shall not be considered and may be recorded.

(5) The applications made not in accordance with above guidelines may be returned to forwarding official or appellant.

All concerns are being requested to strictly adhere with the above procedure, while forwarding applications for medical re-examination by Appellate Medical Board, constituted under Rule 29K of the Mines Rules, 1955.

22.9.15

(Rahul Guha)
Director General of Mines Safety

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Directorate General of Mines Safety

No. DGMS Circular (Tech.) No. 08 /Dhanbad, dated 28/09/2015

To

The Owners, Agents, Managers of Coal Mines, Superintendent of Mines Rescue Stations, Manufacturers/Suppliers of Approved type of Self Contained Self Rescuers, Test Houses conducting tests of Self Contained Self Rescuers and all Inspecting Officers of the Directorate .

Sub: Protocol on use, care, maintenance, sampling & testing of Self Contained Self Rescuer (SCSR) under Regulation 191 D (2) & (3) of the Coal Mines Regulations, 1957.

In view of the difficulties expressed by the users in use, care, sampling and maintenance of Self Contained Self Rescuers (SCSR) a meeting of users, regulators, scientific institutions, academicians and manufactures/suppliers was held on 19th May, 2015 to review issues related to use, care, maintenance, sampling & testing of Self Contained Self Rescuer (SCSR) among other issues. This was followed by another meeting on 3rd June, 2015.

After detailed deliberations, the house opined that Condition No. 6 of Clause A and Condition No. 1.1 of Clause B of DGMS (Tech.) Circular No. 08 of 2008 dated 27.10.2008 requires modification and two new conditions may be incorporated.

A. USE, CARE & MAINTENANCE

1. Condition No. 6 of Clause A is modified as:

   " Every Self Contained Self Rescuer (SCSR) on roll of the mine or mines rescue station shall be subjected to 'Leak Tightness Test', at least once in a quarter by a competent person duly authorized by the manager or superintendent of the mines rescue station for the purpose, in the manner as prescribed in the IS:15803-2008 (Annexure E-1) under Clause 5.7 for Leak Tightness."

2. Condition No. 1.1 of Clause B is modified as:

   " Before a batch of Self Contained Self Rescuer (SCSR) is put into service, samples at the rate of three percent (3%) subject to a minimum of twelve units, for every batch of supply shall be drawn at random for the testing by a joint sampling team comprising of representatives from manufacturer/supplier and user at the user's site."

3. Batch testing of self rescuers may be performed at test houses prescribed in Clause 6.8 of the Approval Policy and in a mines rescue station, in presence of representatives of users and manufacturers who shall sign their respective attendance in a bound paged book kept for the purpose, before commencement and after completion of the tests.

4. Shelf life and service life of self rescuers shall be declared by the manufacturer, based on the prevailing practices and working environment of the mines and would be subject to fulfillment of prescribed conditions for their use. It shall be the responsibility of the user to certify the fitness of self rescuers for use in mines on quarterly basis or any other suitable interval as may be prescribed, which shall be recorded in a bound paged book kept for the purpose and duly countersigned by the mine manager/rescue superintendant/rescue room incharge.

5. All other provisions of the protocol issued vide DGMS (Tech.) Circular No. 08 of 2008 dated 27.10.2008 shall remain unchanged.

28.9.15

Director General of Mines Safety

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Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय
Directorate General of Mines Safety

No. DGMS Circular (Tech.) No. 08 /Dhanbad, dated 28/09/2015

To

The Owners, Agents, Managers of Coal Mines, Superintendent of Mines Rescue Stations, Manufacturers/Suppliers of Approved type of Self Contained Self Rescuers, Test Houses conducting tests of Self Contained Self Rescuers and all Inspecting Officers of the Directorate .

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After detailed deliberations, the house opined that Condition No. 6 of Clause A and Condition No. 1.1 of Clause B of DGMS (Tech.) Circular No. 08 of 2008 dated 27.10.2008 requires modification and two new conditions may be incorporated.

A. USE, CARE & MAINTENANCE

1. Condition No. 6 of Clause A is modified as:

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2. Condition No. 1.1 of Clause B is modified as:

   " Before a batch of Self Contained Self Rescuer (SCSR) is put into service, samples at the rate of three percent (3%) subject to a minimum of twelve units, for every batch of supply shall be drawn at random for the testing by a joint sampling team comprising of representatives from manufacturer/supplier and user at the user's site."

3. Batch testing of self rescuers may be performed at test houses prescribed in Clause 6.8 of the Approval Policy and in a mines rescue station, in presence of representatives of users and manufacturers who shall sign their respective attendance in a bound paged book kept for the purpose, before commencement and after completion of the tests.

4. Shelf life and service life of self rescuers shall be declared by the manufacturer, based on the prevailing practices and working environment of the mines and would be subject to fulfillment of prescribed conditions for their use. It shall be the responsibility of the user to certify the fitness of self rescuers for use in mines on quarterly basis or any other suitable interval as may be prescribed, which shall be recorded in a bound paged book kept for the purpose and duly countersigned by the mine manager/rescue superintendant/rescue room incharge.

5. All other provisions of the protocol issued vide DGMS (Tech.) Circular No. 08 of 2008 dated 27.10.2008 shall remain unchanged.

28.9.15

Director General of Mines Safety

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Directorate General of Mines Safety

No. DGMS Circular (S&T)Tech. No. 10 /Dhanbad, dated 21st Dec, 2015

To

All Owners/Agents/Managers of coal, metal and oil mines and heads of technical institutes and research organisations.

Subject: Protocol for clearance for undertaking R & D projects in mines

As stipulated in the statute, Chief Inspector of Mines has been according approval of certain equipment/apparatuses/appliances and materials for use in mines. The Directorate has framed a policy to prescribe the procedure for according approvals to such products.

Lately, in different forums, mine operators, research organisations and equipment manufacturers have been requesting DGMS for grant of clearances for undertaking R & D projects in mines.

A meeting was held at DGMS on 23.11.2015, with participation from mining industry, research/academic institutes and DGMS, where the issue under reference was discussed and deliberated in detail. On the basis of inputs gathered from the stakeholders' meeting and in-house consultation at DGMS, a protocol for issuing clearance for undertaking R & D projects in mines have been developed.

Clearance for such R & D projects will not be within the purview of the Approval Policy of the DGMS prescribed for products which are commercially marketed by the manufacturers for use in mines.

The protocol for granting clearance for undertaking R & D projects in mines is given as Appendix with the format for submitting the application given at Annexure I.

18.12.15
Director General of Mines Safety

Appendix

Protocol for clearance for undertaking R & D projects in mines

Abbreviations - DGMS: Directorate General of Mines Safety; R&D: Research & Development; S&T: Science & Technology; CIMFR: Central Institute of Mining and Fuel Research; CMPDI: Central Mine Planning and Research Institute; IIT: Indian Institute of Technology; ISM: Indian School of Mines; NIT: National Institute of Technology; NIRM: National Institute of Rock Mechanics; TCS: Tata Consultancy Services; CMC: Computer Management Corporation.

Considering the hazardous atmosphere and working environments in mines, the statute stipulates use of certain prescribed approved type of equipment, appliances etc. in such hazardous atmosphere. This issue of granting clearance for undertaking R&D projects in mines has been raised by mine operators and research institutes on several forums.

To facilitate technological development, it has been decided to frame a protocol for issuing clearance for undertaking R & D projects in Indian mines. Academic institutions of repute (IITs/ISM/NITs/National Universities etc.), R & D organizations recognised by Govt. of India, eminent research institutes (CIMFR, CMPDI, NIRM etc.) interested in taking up R & D projects in mining may approach DGMS requesting for clearance. It may be noted that under no circumstances, the type of equipment/appliances etc. used in the R & D project shall be considered approved by this Directorate. Clearance for such R & D projects will not be within the purview of the Approval Policy of the DGMS which stipulates the procedure for according approvals to equipment, machinery, materials and appliances, etc. which are commercially marketed by the manufacturers for use in mines.

The conditions for issue of clearance, among others, are furnished below:

(1) Proposals shall be made in the prescribed application format (Annexure I).

(2) An executive summary on the project specifying the technical details shall be submitted with the application.

(3) In case of a joint venture project, a brief write-up on the background of the individual organizations and their scope in the project shall be submitted with the application.

(4) At least one research institute/R&D organization/academic institution who will be the principal executing agency, is required to be a part of the project in case of a joint venture project.

(5) A write up on the methodology to be adopted and the benefits expected out the project shall be submitted with the application.

(6) One Project Head shall be nominated by the research institute/R&D organization/ academic institution.

(7) A list of all persons involved in the project with details of their academic background and relevant experience shall be submitted with the application. In case of requirement of any additional support personnel, there details shall also be furnished.

17.12.2015

(8) The application shall specifically mention the name of the mine where it is proposed to undertake the project. Further it shall also specify the location(s) where the equipment, machinery, materials and appliances, etc. is/are proposed to be installed decided in consultation with the mine management. The consent of the Owner/Agent/Mine Manager in this regard shall be submitted with the application.

(9) Unless otherwise specified, such issue of clearance shall be mine specific and will not be permitted:

(a) In any mines/seams other than mines/seams of first degree of gassiness in case of coal mines.
(b) In zones other than Zone 2 hazardous area, in case of oil mines.

In case of metalliferous mines, there will be no such restrictions.

(10) Unless otherwise specified;

(a) In case of belowground coal mines, use of electrical equipment/apparatus forming integral part of the project may be permitted, if certified to be safe for use in mines with first degree of gassiness and subject to adherence of prescribed conditions. In case of intrinsically safe and flameproof equipment/apparatus certified as per relevant and acceptable standards, may be accepted.
(b) In case of oil mines, use of electrical equipment/apparatus forming integral part of the project may be permitted, if certified to be safe for use in mines in zone 2 hazardous area, and subject to adherence of prescribed conditions. In case of intrinsically safe and flameproof equipment/apparatus certified as per relevant and acceptable standards, may be accepted.

(11) A time frame for completion of the project shall be mentioned in the application and clearance shall be issued accordingly. Any extension beyond the declared time frame shall be based on the justification seeking such extension.

(12) Under the overall charge of the Mines manager, the execution of the R & D project shall be under the supervision of an official of the mine not below the rank of an assistant manager/ installation manager. A panel of supervisors entrusted with the task of supervision and a mechanism of supervision shall be prepared by the mine management. A copy of the mechanism shall be submitted with the application.

(13)Where special condition(s) exist, the Chief Inspector may consider issue of clearance subject to the conditions he may specify therein for:

(i) coal mines/seams other than first degree gassiness and;
(ii) zones other than zone 2 hazardous area in case of oil mines.

(14)A half yearly report on the progress of the R&D project shall be submitted to DGMS by the Project Head.

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Annexure-I

Format for application for clearance for undertaking R & D Projects

(To be filled in by the Project Head)

Part I (General)

1. Title of the project:
2. Names and addresses of institutions and organisations involved in the project:
3. Name and address of the Project Head:
4. Brief Description of the project:
5. Objectives of the project:
6. Detailed methodology (Enclose a separate write-up):
7. Scope of responsibilities of the individual institutions and organisations:
8. Work plan on the projected time frame:
9. Minimum duration of the project:
10. Expected outcomes from the project:
11. Agencies which may be benefitted by the project:

Part II (Equipment/material/appliance)

1. Name of the equipment, materials or appliances involved in the project:
2. Description of the equipment, materials or appliances with specifications (Enclose as separate annexure):
3. Test reports of electrical equipment regarding intrinsically safe/flame proof characteristics if applicable (Enclose self certified copies):
4. Service life:
5. Provide details, in case the equipment, materials or appliances have approval in any industry in India or abroad:

Part III (Application Area)

1. Name and full address of the mine where it is intended to carry out the project:
2. Specify location on the mine plan with ventilation details where the concerned equipment, materials or appliances are intended to be installed (Enclose mine plan):
3. Name of the manager of the mine (Enclose copy of the consent of the Owner/Agent/Mine Manager):
4. Details of supervision (Enclose a mechanism of supervision separately):

I, hereby, certify that all information furnished in this application and documents, reports, drawings etc. enclosed with the application are correct. I also undertake to abide by all the conditions prescribed in the protocol for grant of permission and the applicable provisions stipulated in the regulations, rules etc. framed under the Mines Act, 1952.

Signature:
Name:
Designation:
Institution/organisation:

17.12.2015

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Directorate General of Mines Safety

No. DGMS Circular (Tech.) No. 01 /Dhanbad, dated 21st Jan, 2016

To

All Owners/Agents/ Managers of Coal and Metalliferous Mines, Superintendents of mines rescue stations and Incharges of mines rescue rooms.

Subject: Permission under Rule 37 and Rule 11(4) of Mines Rescue Rules, 1985 to maintain breathing apparatus of different type and make in rescue stations and rescue rooms.

Rule 11 (4) of the Mines Rescue Rules, 1985 stipulates maintaining of self contained breathing apparatus in the rescue stations and the ones in rescue rooms to be of same type and make. Due to entry of new manufacturers and importers of breathing apparatus in the domestic market and continuous technical advancement of the equipment, it is observed that compliance of the above rule at times becomes impracticable. Considering the requests from users for exemption from compliance of the above rule, specific permissions under Rule 37 of the aforesaid rules are being granted to various rescue stations.

As the practice of maintaining breathing apparatus of different type and make in rescue stations and rescue rooms appears to continue by seeking permission from this Directorate, it is decided to issue this general order permitting maintenance of breathing apparatus of different type and make in rescue stations and rescue rooms subject to strict compliance of the following conditions:

(i) In case of rescue stations and rescue rooms maintaining more than one type and/or make of breathing apparatus, the rescue superintendent shall ensure that:
  (a) all the instructors, rescue brigade members and rescue room attendants are fully acquainted with the use, maintenance and testing of all types and makes of breathing apparatus;
  (b) all the rescue trained persons are imparted of refresher practices with each type or make of breathing apparatus as prescribed in Schedule VII of the aforesaid rules; and
  (c) the type/make of breathing apparatus used in each practice for all the rescue trained persons are mentioned in the training records.

(ii) This exemption is being accorded without prejudice to any other statute which may be or may become applicable at any time.

21.01.16
Director General of Mines Safety

सत्यमेव जयते

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Directorate General of Mines Safety

No. DGMS Circular (Tech.) No. 02 /Dhanbad, dated 21st Jan, 2016

All Owners/Agents/Managers of belowground coal and metal mines and Superintendents of rescue stations.

Subject: Periodic testing of breathing apparatus, reviving apparatus etc. maintained at rescue stations and rescue rooms.

Rescue equipment like breathing apparatus, reviving apparatus etc. are statutorily required to be maintained in the rescue stations and the rescue rooms. These equipment need to undergo periodic testing at intervals of one month or at shorter intervals as may be mentioned by the manufacturers in accordance with Schedule IV of the Mines Rescue Rules, 1985 or its revised versions. Records of such testing(s) are to be maintained in the rescue stations and rescue rooms. As required under Rule 12 (2) (a) of the above rules, the Superintendent shall ensure that such equipment and apparatus are maintained in perfect working order. Also Rule 13 of the above rules requires the Instructors to make inspections, tests and adjustments of the equipment and apparatus under the direction of the Superintendent and maintain records thereof.

In order to bring uniformity in the system of maintaining records of periodic testing of breathing apparatus, a format has been developed which is given at Annexure-I. In the enclosed format, every entry of test results of every apparatus shall end with the remarks "fit for use", if found so. Every such record shall be signed by the person who has performed the test and countersigned by the Instructor, Rescue Room Incharge and Superintendent of the rescue station.

In addition to this, in every rescue station and rescue room, there shall be maintained a record signed by the Superintendent in the proforma given at Annexure-II certifying that the particular breathing apparatus is in maintained in perfect working order. Such records shall be updated at least one in every quarter based on the results of the latest tests or at interval as may be prescribed.

21.01.16
Director General of Mines Safety

Annexure-I

Name of the Company

Mines Rescue Station/Room ________________

Testing Report of Self Contained Breathing Apparatus

Name of the Apparatus ____________________ Set No. ____________________ Month ________________________ Date____________

(1) Apparatus Identification No.	(2) O_2 Cylinder, Pressure Reducer, Display Unit Identification Nos. (Mention Identification No. if any)	(3) Visual Inspection (In order/ Not in Order)	(4) *Battery Charge Test (if applicable)	(5) Condition of Face Mask/ Mouthpiece (In order/ Not in Order)	(6) *Alarm System Test (if applicable	(7) *Residual Pressure Warning Test (if applicable)	(8) *High Pressure Leakage Test	(9) *Constant Flow Test (LPM)	(10) *Demand Valve/ Minimum Valve Test	(11) * Relief Valve Test /Vent Valve Test	(12) *By Pass Valve Test/ Manual Booster Valve Test	(14) Pressure in O_2 Cylinder (Bar) and Identification No. of the Mother Cylinder from which it is filled	(15) Date of filling of CO_2 Absorbent and Batch No. of the Absorbent.	(16) *Low Pressure Leakage Test /Positive Pressure Leakage Test	(17) *Negative Pressure Leakage Test (if applicable)	(18) *Inhalation Valve Test	(19) *Exhalation Valve Test	(20) *Drainage Valve Test (if applicable)	(21) Fit for use (Yes/ No)

Tested By

(Signature & Name)

(Signature of the Instructor/Rescue Room Incharge)

(Signature of the Superintendent)

Note- * Manufacturer's criterion prescribed for the test parameters to be mentioned.
A separate record indicating the purity of oxygen filled in the mother cylinder(s) to be maintained.

21.01.2016

Annexure-II

Certificate of Fitness to be issued on or before 7th day of every month

This is to certify the following equipment in the mines rescue stations/ rescue rooms and rescue rooms (whichever is applicable) as per Schedule I, II or III respectively of the Mines Rescue Rules, 1985 are maintained in perfect working order as per the tests conducted in accordance with criteria and procedure prescribed by the manufacturers on the dates given against each of them:

Sl. No.	Name & Identification No. of the equipment	Make	Date of Testing

Date:________

Signature of Superintendent
Mines Rescue Station,________
M/s ________________________

21.01.2016

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Directorate General of Mines Safety

No. DGMS (Tech) Circular (MAMID)/ 03 Dhanbad, dated : 14 / 03 /2016

To
The Owner/Agent & Mangers
All Coal, Metalliferous and Oil Mines.

Subject: Safety features to be incorporated and maintained in crawler/tyre mounted machineries deployed in mines.

A serious accident took place in an open-cast mine, in which a dozer moved forward while the dozer operator, standing on track pad, started the dozer directly by short-circuiting the self-starter, keeping the machine in gear. The dozer operator fell between the dozer blade and the track pad and was run over by the track-pad inflicting serious injuries to both his legs and right hand leading to amputation of both the legs below knee.

After the accident, a study was undertaken in which all 278 numbers of crawler and tyre mounted machineries (hereinafter called machineries) deployed in the mine were examined.

The investigation revealed the following :

(a) Neutral Switch electrical interlock with gear, which prevents starting of machineries if in geared position, was either not found in order or not provided in 90% of the machineries.

(b) Hydraulic safety valve interlock, which prevents movement of the machineries even if its engine starts in geared position; the machineries will move only when the gear is brought to neutral position and then gear lever is shifted to engaged position. This safety feature was either not found in order or not provided in 35% of the machineries.

(c) Self-starter protection guard, which prevents short-circuiting the terminals of self-starter motor, was either not found in order or missing in 89% of machineries.

During the period from 2012 to 2015, about 45% fatal accidents and 22% serious accidents took place due to machineries in coal mines. The same figures in non-coal mines were about 30% and 38% respectively.

The above findings of the investigation/examination highlight the need to take appropriate action in ensuring proper functioning safety devices provided in machineries for the greater benefit of persons employed in mines and machineries deployed therein.

There is no doubt that if the machineries are maintained in safe working order, required safety devices are provided & maintained and work persons (operators/ helpers/mechanics/electricians/supervisors/engineers) are adequately trained, it would be possible to eliminate recurrence such accidents in future.

I, therefore, request you to take necessary action to maintain all required safety features in crawler/tyre mounted machineries deployed in the mines, impart adequate training to all related work persons and improve safe work culture.

Yours faithfully,

14.03.16

(Rahul Guha)
Director General of Mines Safety

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No. DGMS Circular (Tech.) No. 04 /Dhanbad, dated 31 मार्च, 2016

To

All Owners/Agents/ Managers of Coal and Metalliferous Mines, Superintendents of mines rescue stations, Incharges of mines rescue rooms and manufacturers and suppliers of breathing apparatus.

Subject: Cylinders to be used in breathing apparatus used in mines

Oxygen or compressed air cylinders are integral parts of all breathing apparatus(es). For use in Indian mines closed circuit and open circuit breathing apparatuses are accorded approval by Directorate General of Mines Safety subject to conformation of the apparatus as per standards specified in IS 10245-1 and IS 10245-2 respectively of the Bureau of Indian Standards, among other conditions. It is specified in the above standards that cylinders and valves fitted with the breathing apparatus shall comply with the provisions of the Gas Cylinder Rules, 1981 (presently Gas Cylinder Rules, 2004)

In the Approval Policy, it is stipulated that no change shall be made to the equipment which had been tested for grant of approval unless specifically approved and this is also applicable in case of cylinders used in breathing apparatus(es). In the recent years, different types of gas cylinders are available which are compatible with the breathing apparatus(es). To facilitate use of cylinder other than the ones fitted with the apparatus tested at prescribed test house for obtaining DGMS approval, the following conditions have been laid down which shall also be applicable to the cylinder currently in use:

(i) All cylinders used with the breathing apparatus shall be approved by the Chief Controller of Explosives, PESO under the Gas Cylinders Rules, 2004.

(ii) The valves fitted with the cylinders shall comply with the requirements of IS 7302 of the Bureau of Indian Standards as amended from time to time.

(iii) The colour of the cylinders shall be as specified in IS 3933 of the Bureau of Indian Standards as amended from time to time.

(iv) A certificate regarding the compatibility of the cylinder for use with the breathing apparatus shall be issued by the manufacturer to the user(s).

(v) The stipulations made in the DGMS Circular No. 8 of 1974 regarding the material of the cylinder, shall be applicable.

31.3.16

Director General of Mines Safety

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Directorate General of Mines Safety
धनबाद / Dhanbad - **826 001**.

No. DGMS (Tech.) (S&T) Circular no. 05 Dhanbad, Dated 2th April 2016

To

All Owners/ Agents/ Managers of coal and metalliferrous mines

Integrated approach for development of Safety Management Plan for coal and metalliferous mines

The ninth and tenth Conference on Safety in mines recommended adopting Risk Assessment as a tool for development of appropriate health & safety management systems in Indian mines. The eleventh Conference further recommended that the managements of every mining company should adopt the process of safety management system and commit itself for proper formulation and implementation of the same in totality.

Drawing inputs from inferences drawn from several workshops on "Risk Assessment" in Indian mines conducted by DGMS, a document on "Safety Management System – A guideline for implementation" was prepared and circulated as DGMS(Tech)(S&T) Circular No. 13 of 2002. Another guideline in this regard titled "Safety Management System-Provision for auditing and review" was issued by DGMS as DGMS (Tech)(S&T) Circular No. 02 of 2011.

Successful implementation of Safety Management System in Mines would warrant sorting out perception issues among all stakeholders, and the success may depend on among others, adoption of an integrated approach.

The matter has been discussed with various stakeholders of coal and metalliferous industry in the recent past. During interaction some of the implementation issues inhibiting its outreach were flagged. They are: lack of penetration of the concept at grass root level; confusion about implementation strategy, and; lack of involvement of frontline mining personnel in developing the document.

In view of the above, an integrated implementation strategy, as a sequel to the DGMS (Tech)(S&T) Circular No. 13 of 2002 (without appendixes), has been developed and enclosed as Annexure for compliance.

You are requested to take necessary steps for development of Safety Management System in the mines under your control with the help of above guidelines. The Mine Manager shall submit a copy of the Safety Management Plan to the Regional Inspector of Mines for acceptance.

2.4.16

(Rahul Guha)
Director General of Mines Safety
Encl. – Annexure (1-10) & sample worksheet (S1-S9)

Annexure [DGMS (Tech.) (S&T) Circular No. 5 dated 2/4/2016]

1. Hazard identification & Risk Management

1.1 Formation of team: Mine Manager/Operations-in-charge as team leader, members may be suitably chosen from the following for carrying out hazard identification and risk management in mines.

a) Safety officer
b) Engineer (Mines)
c) Workmen's Inspector(s)
d) In-charge, mine production
e) In-charge, mechanical section
f) In-charge, electrical section
g) In-charge, civil wing
h) In-charge, occupational health & hygiene
i) In-charge, mine surveying
j) Supervisor's and/or workmen selected from activities mentioned at (d), (e), (f), (g), (h) and (i), including machine operators, fitters and electricians
k) Rapportier(s)

For advice and technical guidance regulators, eminent mining scientists, experts from academic & research institutions and representatives from manufacturers may be invited to participate in risk assessment sessions.

Team may co-opt members if considered necessary.

1.2 Tools of Risk Management: (a) Following documents may be arranged for consideration of team.

- Minutes of safety committee meeting
- Workmen's Inspectors report
- Contraventions pointed out by regulators and action taken report
- Safety officer's inspection report
- Report (s) submitted by Internal Safety Organization, if any
- Previous risk assessment document, if any
- Report (s) on accidents and near misses

A study of the above reports may help in identifying key safety and health issues in different areas of mining operations.

(b) A computer system which supports Microsoft Office 2007 or its latest version and printer.

1.3 Getting Started – Hazard Identification

Inquest into mining accidents and incidents often reveal systems failure. The system comprises of man, machines, and materials that are designated to perform a spelled task in a specified environment. All constituent are interconnected to perform the task. A failure of any constituent can cause a failure of the system. A risk assessment exercise needs to take into account all the constituents and any associated hazards and human factors.

Every mine, operational, discontinued or abandoned has a threat perception based on systems analysis through an established procedure or by assessment of safety professionals. A control system generic or otherwise may be in place to maintain the workplace risk within acceptable level.

Looking out for hazards is to identify the (i) probable location where there is a likelihood of release of unwanted energy or object(s) (ii) medium through which the unwanted energy or object(s) may travel and, (iii) the miner may be in danger of being contacted by the unwanted energy or object(s).

While identifying hazards in a classified sector, number of workers who may be exposed need to be taken in account to ascertain possible degree of consequences in the event of a mishap in following manner:

Table 1

Serial No	Percentage of work persons employed	Impact assessment of exposure
1.	>40	Maximum
2.	20-40	High
3.	10-20	Medium
4.	5-10	Low
5.	<5	Very Low

An example of identification of hazards and categorization thereof have been detailed in Table 2

Table 2: Initial Hazard Identification
(28 Hazards Initially Identified)

Sl. No.	Description of Hazard	Percentage of workers exposed	Cons.	Prob.	Exposure	total
1	Existing Mine Fire-potential for explosion					
2	Roof fall (Strata control)					
3	Mine Gases					
4	Waterlogged workings					
5	Survey-incorrect mine plan					
6	Improper survey instruments					
7	Lack of skilled persons/using unskilled persons in specified jobs					
8	Inundation from surface source					
9	Surface blasting and vibrations					
10	Winding (Shaft)					
11	Boilers					
12	Blasting					
13	Spontaneous Combustion					
14	Unauthorized entry to mine workings					
15	Lack of illumination					
16	Haulage & transport failure					
17	Side fall					
18	Moving machinery (including illegal man-riding on SDL etc.)					
19	Electricity					
20	Drivages not to plan					
21	Carbon monoxide poisoning					
22	Material handling					
23	Respirable dust					
24	Noise					
25	Inadequate Ventilation					
26	Slippery roadway					
27	Improper traveling roadway					

Table 3: Hazard Identification

HAZARDS IDENTIFIED AS HIGH RISK
(Risk > 200)
Requiring immediate attention

Sl. No.	Description of Hazard	Percentage of workers exposed	Cons.	Prob.	Exposure	Total
1	Existing Mine Fire-potential for explosion					
2	Roof fall (Strata control)					
3	Mine Gases					
4	Waterlogged workings					
5	Survey- incorrect mine plan					
6	Improper survey instruments					
7	Lack of skilled persons/using unskilled persons in specified jobs					
8	Inundation from surface source					

Hazard Identification (Continued)

OTHER HAZARDS IDENTIFIED AS RISKS REQUIRING MANAGEMENT ACTION
(Risk <200 and >20)

Sl. No.	Description of Hazard	Percentage of workers exposed	Cons.	Prob.	Exposure	Total
1	Surface blasting and vibrations					
2	Winding (Shaft)					
3	Boilers					
4	Blasting					
5	Spontaneous Combustion					
6	Unauthouised entry to mine workings					
7	Lack of illumination					
8	Haulage & transport failure					
9	side fall					
10	Moving machinery (including illegal man-riding on SDL etc.)					
11	Electricity					
12	Drivages not to plan					
13	Carbon monoxide poisoning					

Hazard Identification (Continued)

OTHER HAZARDS IDENTIFIED AS LOW RISK BUT TO BE REVIEWED

(Risk <20)

Sl. No.	Description of Hazard	Percentage of workers exposed	Cons.	Prob.	Exposure	Total
1	Material handling					
2	Respirable dust					
3	Noise					
4	Inadequate Ventilation					
5	slippery roadway					
6	Improper travelling roadway					

Table 4: Summarized Hazard Identification

11 Major Hazard Categories Identified

(01) Mine Fires
(02) Inundation
(03) Machinery
(04) Strata Control
(05) Mine Gases
(06) Electricity
(07) Blasting & Use of Explosives
(08) haulage & Transportation
(09) Spontaneous Combustion
(10) Occupational Health
(11) Emergency Response

Table 5: Categorization of Identified Risks

No.	Major Hazard	Sub Category of Hazard
1	Mines Fires	: Existing Mine Fire :Lack of skilled persons/using unskilled persons : Surface blasting and vibrations :Unauthorized entry to mine workings :Coal dust - explosion :Inadequate Ventilation
2	Inundation	:Waterlogged workings :Survey- incorrect mine plan :Improper survey instruments :Lack of skilled persons/using unskilled persons :Inundation from surface source : Surface blasting and vibrations :Drivages not to plan
3	Machinery	:Lack of skilled persons/using unskilled persons :Winding (Shaft) :Boilers :Lack of illumination :Moving machinery (including illegal man-riding on SDL etc.)

Categorization of Identified Risks (continued)

No.	Major hazard	Sub Category of Hazard
4	Strata Control	:Roof fall (Strata control) : Side fall :Lack of skilled persons/using unskilled persons :Improper survey instruments :Surface blasting and vibrations :Lack of illumination
5	Mine Gases	:Mine Gases :Fire damp :Coal dust - explosion :Inadequate Ventilation
6	Electricity	:Electricity :Lack of skilled persons/using unskilled persons

Categorization of Identified Risks (continued)

No.	Major Hazard	Sub Category of Hazard
7	Blasting & Use of Explosives	:Blasting :Lack of skilled persons/using unskilled :Coal dust - explosion :Drivages not to plan
8	Haulage & Transportation	:Lack of illumination :Haulage & transport failure :Moving machinery (including illegal man-riding on SDL etc.) :Material handling
9	Spontaneous Combustion	:Spontaneous Combustion
10	Occupational Health	:Respirable dust :Noise :Lack of illumination
11	Emergency Response	:Improper travelling roadway

1.4 Development of worksheet for Risk assessment, control and audit

The template of worksheet for risk assessment, control and audit exercise may include, among others, document number, title, name of the mine, company, date conducted, location, etc. followed by the list of assessment team members and facilitators, as below:

RA WORKSHEET- UG-MVH/RA/

Risk Assessment - Mine Ventilation/inundation/....... in underground coal/metal mines

Name of the Mine: AAA Name of the Company: BBB

Date Conducted: CCC

Location: DDD

Assessment Team (May include)	
Name	**Designation**
EEE	Mines Manager (MM)
FFF	Colliery Engineer (CE)
GGG	Safety Officer (SO)
HHH	Ventilation Officer (VO)
III	Assistant Manager (AM)
JJJ	Mechanical Engineer/Asst. Mechanical Engineer (ME/AME)
KKK	Electrical Engineer/Asst. Electrical Engineer (EE/AEE)
LLL	Medical Officer (MO)
MMM	Civil Engineer (CER)
NNN	Survey Officer/Surveyor (SUO/SUR)
OOO	Workman Inspector (Mining) (WIM)
PPP	Workman Inspector (Mechanical) (WIME)
QQQ	Workman Inspector (Electrical) (WIE)
RRR	Overman/ Mining Sirdar (OM/MS)
SSS	Foreman (Mechanical/Electrical)
TTT	Electrical /Mechanical Supervisor (ES/MS)
UUU	Radiologist
VVV	Workmen/ Safety Committee Members
Add	Add

Facilitators (May include)	
Name	**Designation**
WWW	Deputy Director/Director, DGMS
XXX	Chief/ Deputy Chief/Member, ISO
YYY	Area Safety Officer
ZZZ	Area Medical Officer
EEFF	Area Engineer (Electrical)
GGHH	Area Engineer (Mechanical)
IIJJ	Scientist, Research Institutions
KKLL	Subject Expert, Educational Institutions
Add	Add

1.5 Risk Assessment

A sample of risk assessment exercise conducted in respect of mine inundation has been furnished as Table 6.

1.6 Risk control

While developing Risk Control plans for identified hazards, due weight age may be ascribed to the number of workers present at the place of work to assign priority.

A sample Risk Control plan pertaining to mine inundation assigning the responsibility and time limits for completing the designated action (s) has been furnished at Table 7.

1.7 Auditing

Auditing of Risk management scheme is to be conducted by trained auditors. Incomplete activities which have been assigned Immediate Action (IA) tag by auditors depending upon hazard perception, severity and exposure, need to be reported to agent(s) and owner(s) by the manager. A system may be devised to send daily/weekly/fortnightly/monthly progress report as the case may be, by the manager to agent(s) and owner(s), till the activities with IA tag are satisfactorily completed.

A sample audit sheet indicating gaps in achieving risk control within specified time frame in respect of mine inundation has been furnished at Table 8.

1.8 Emergency exercise

International best practices suggest that the exercise to be systematic in nature and consistent with the concept of mutual assistance from other mines. It should be able to make direct reference to the risks at the mine. The purview of the exercise should be inclusive of external agencies such as DGMS, police, media and senior company officials. The conduct of exercise is subject to risk assessment principles to ensure the exercises do not introduce new safety risks to persons at a mine and have an audit and evaluation process.

1.8 Concluding Remarks

The developed Safety Management Plan in respect of a coal or metal mine may contain, among others the following:

- ✓ Mine Safety & Health Policy with a plan for its implementation;

- ✓ Organizational structure and resources for implementation of (a) mine safety & health policy and (b) safety management plan
- ✓ Risk Assessment data sheets;
- ✓ Hazard Control Plans for identified hazards;
- ✓ A list of Hazard Control Plans with yellow Flag (YF);
- ✓ Audit sheets for Hazard identification and Control Plans;
- ✓ A list of Hazard Control Plans with Immediate Action Flag (IAF);
- ✓ A list of developed Code of Practices (COP);
- ✓ A list of developed schedules, schemes and strategies
- ✓ A list of developed Standard Operating Procedures (SOP);
- ✓ A list of developed processes, protocols and systems
- ✓ Emergency Management Plan including trigger action response plans (TARP) and emergency initiation protocol (EIP);
- ✓ Emergency exercise logs and recommendations;
- ✓ Maintenance schedules of electrical equipments used in the mine;
- ✓ Maintenance schedules of mechanical equipments used in the mine;
- ✓ Safety manuals of electrical & mechanical equipments used in the mine; and
- ✓ A list of trainings/refresher trainings conducted.

The list of Hazard Control Plans with yellow and Immediate Action Flag need to be accorded due priority by Agent & Owner. A schedule for implementing the recommendations made during the conduct of emergency exercise need to be drawn by the mine manager in consultation with agent/owner in a time bound manner. A copy of correspondences made with concerned authorities and agencies regarding mitigation of identified hazards in the mine may be kept for records.

(Rahul Guha) 2.11.10
Director General of Mines Safety

Table: 6

Sample worksheet (Risk Assessment: Inundation in underground coal mines)

Name of the Mine: AAA Name of the Company: BBB

Date Conducted: CCC

Location: DDD

Assessment Team	
Name	Designation
EEE	Mines Manager (MM)
FFF	Safety Officer (SO)
GGG	Ventilation Officer (VO)
HHH	Assistant Manager (AM)
JJJ	Survey Officer/ Surveyor (SURO/SUR)
KKK	Workman Inspector (Mining) (WMI)
LLL	Overman/ Mining Sirdar (OM/MS)
MMM	Workmen/ Safety Committee Members
Add	Add

Facilitators (may include)	
Name	Designation
PPP	Deputy Director/Director, DGMS
QQQ	Chief/ Deputy Chief/Member, ISO
RRR	Area Safety Officer
SSS	Scientist, Research Institutions
TTT	Subject Expert, Educational Institutions
Add	Add

Hazard identification as regards to inundation in multiple seam underground workings with caving/ stowing.

Abbreviations: **HAZ:** Hazard; **CONS:** Consequence; **EXPS:** Exposure; **PROB:** Probability.

HAZ NO	HAZARD	MECHANISMS	CALCULATED RISK				COMMENTS
			CONS	EXPS	PROB	RISK RATING	
1	2	3	4	5	6	7	8
UNH -1	Lack of knowledge on procedures.	Documents available are sketchy and not adequate.	05	10	10	500	Workshop on development of Safety Management Plan need to be conducted.
UNH -2	Lack of knowledge on procedures.	Workers and supervisors not trained to follow procedures.	05	10	10	500	Specialised refresher training required.
UNH -3	Lack of knowledge on procedures.	Surveillance to implement procedures.	05	10	10	500	Specialised process(es) to be devised.

HAZ NO	HAZARD	MECHANISMS	CALCULATED RISK				COMMENTS
			CONS	EXPS	PROB	RISK RATING	
1	2	3	4	5	6	7	8
UNH -4	Sudden inrush of water in underground mine workings from surface.	Failure of coal pillars due to existence of fire in underground, allowing connection through subsidence cracks with shallow surface rain water accumulation and flooding of underground.	05	10	07	350	
UNH -5	Sudden inrush of water in underground mine workings from surface.	Failure of embankment constructed at river bank due to heavy rain, and entry of water from surface through old workings and subsidence area to underground mine workings.	05	10	07	350	
UNH -6	Sudden inrush of water from workings of one seam to another seam in underground.	Failure of dam constructed in the connection drift between workings of two seams, causing sudden inrush of water from workings of one seam to another seam in underground.	05	10	07	350	
UNH -7	Sudden inrush of water in underground mine workings from surface.	Flooding of river due to heavy rain and water finding its way to underground workings through subsided area over goaf or mine entries.	05	05	07	175	
UNH -8	Sudden inrush of water from workings of same seam or from one seam to another seam in underground.	Barriers against water logged old workings failing under hydrostatic pressure causing inrush of water in underground workings.	05	10	07	150	
UNH -9	Sudden inrush of water from workings of same seam or from one seam to another seam in underground	Sudden inrush of water from old water logged workings of same seam or from one seam to another seam in underground due to accidental connection.	05	05	02	50	
UNH -10	Sudden inrush of water in underground mine workings from surface.	Failure of river bank/embankment due to damage from mine subsidence.	05	10	01	50	
UNH -11	Sudden inrush of water in underground workings from adjacent strata.	Pillar failure or creep allows goaf formation to connect with subsurface water body/aquifer.	05	10	01	50	
UNH -12	Sudden inrush of water in underground workings from adjacent strata.	Roof fall in development workings taps overlying aquifer or subsurface water accumulation.	05	1.5	02	15	
UNH -13	Sudden inrush of water in underground workings from	Mine workings intersect geological structure providing water flow channel.	01	02	01	02	

HAZ NO	HAZARD	MECHANISMS	CALCULATED RISK				COMMENTS
			CONS	EXPS	PROB	RISK RATING	
1	2	3	4	5	6	7	8
	adjacent strata.						
UNH -14	Sudden inrush of water in underground workings from adjacent strata.	Existing mine workings intersect open boreholes.	0.1	2.0	07	1.4	
UNH -15	Sudden inrush of water trapping mine workers in underground.	Proper emergency response protocol including effective communication from surface to underground not in place.	05	02	10	100	Workshop on Emergency Preparedness & Response systems needs to be conducted.
UNH -16	Sudden inrush of water trapping mine workers in underground.	Lack of exposure and practice of workers and supervisors to follow emergency response protocol.	05	02	10	100	

Table: 7

Sample worksheet (Control Plan: Inundation in underground coal mines)

Name of the Mine: AAA **Name of the Company: BBB**
Date Conducted: CCC
Location: DDD

Assessment Team	
Name	**Designation**
EEE	Mines Manager (MM)
FFF	Safety Officer (SO)
GGG	Ventilation Officer (VO)
HHH	Assistant Manager (AM)
JJJ	Survey Officer/ Surveyor (SURO/SUR)
KKK	Workman Inspector (Mining) (WMI)
LLL	Overman/ Mining Sirdar (OM/MS)
MMM	Workmen/ Safety Committee Members
Add	Add

Facilitators (may include)	
Name	**Designation**
PPP	Deputy Director/Director; DGMS
QQQ	Chief/ Deputy Chief/Member, ISO
RRR	Area Safety Officer
SSS	Scientist, Research Institutions
TTT	Subject Expert, Educational Institutions
Add	Add

Inundation Hazard Control Plan in multiple seam underground workings with caving/stowing.

Abbreviations: **RSP**-Relevant Statutory Provisions; **DGC**- DGMS Circulars; **MG**-Management Guidelines; **ERCI**-Existing Risk Control Index; **Res**- Responsibility; **Med**- Medium; **Reg**- Regulation of draft Coal Mines Regulations'2015; **Rul (T)**: Rule of Mine Vocational Training Rules' 1966; **SOP**- Standard Operating Procedure. **YF**- Yellow Flag.

Mechanism	**Control**	**RSP/DGC/ MG**	**Procedure**	**ERCI**	**Res**	**Comments**
Failure of coal pillars due to existence of fire in underground allowing connection through subsidence cracks with shallow	1. Ensure efficient measures of controlling underground fire by trained personnel under competent supervision.	Reg. 137(6) &139(5) & MG.	1. Devise a mechanism for fighting of underground fire in consultation with experts of an academic institute and implement the same under managerial supervision.	Low	MM & Agent.	1. To be put in place within one month (YF).

Mechanism	Control	RSP/DGC/ MG	Procedure	ERCI	Res	Comments
surface rain water accumulation and flooding of underground workings.	2. Ensure drainage of rain water from large surface depression and filling up of the same.	Reg.150(1).	2. Constitute a team for drainage of water from surface depression and filling up of the same, as and when required under competent supervision.	Med	AM & MM.	2. To be put in place within fifteen days (YF).
	3. Training of mine personnel.	Rul(T)-09; DGC– Legis 4/1975	3. Conduct specialized training of mine personnel on danger of inundation.	Med	MM & Agent.	3. To be completed within one month's time.
Failure of embankment constructed at river bank due to heavy rain and entry of water from surface through old workings and subsidence area to underground mine workings.	1. Assess the strength and stability of embankment constructed at river bank.	Reg150(9) & (10); DGC2/1978.	1. Conduct a study for assessing strength and stability of embankment in consultation with experts of a research institute. Implement suggestions for strengthening embankment, if any, under competent supervision.	Low	Civil Engineer, AM & MM.	1. System to be put in place within two months time before onset of monsoon (YF).
	2. A system of sounding warning during heavy rain and withdrawal of persons from underground, if considered necessary, to be in place.	Reg150(5); DGC2/1978.	2. Devise a code of practice for warning during heavy rain, and evacuation of work persons from underground, if warranted.	Med	AM & MM.	2. System to be put in place within one month's time (YF).
Failure of dam constructed in the connection drift between workings of two seams, causing sudden inrush of water from workings of one seam to another seam in underground.	Assess stability of dam from available records. If need be, explore the possibility of strengthening the existing dam or construction of a new dam.	Reg 153.	1. Conduct stability assessment exercise in consultation with experts of a research/academic institute.	Low	Civil Engineer, AM & MM.	1. Complete exercise within one month time (YF).
			2. Formulate a work process for strengthening of existing dam or construction of a new dam and execute the same by trained personnel under competent supervision.	Low	Civil Engineer, AM & MM.	2. The work process to be formulated and executed within three months time (YF).
Flooding of river due to heavy rains and water finding its way to underground workings through goaf and /or mine entries.	Access rainfall data of last thirty years in the area and corresponding High Flood Level (HFL) to formulate strategy for preventing entry of water in underground workings through goaf and/or mine entries.	Reg150(2).	Formulate strategy for preventing entry of water in the underground workings through goaf and/or mine entries and initiate action for implementing the same.	Low	Mine Planning Engineer, AM & MM.	System to be put in place within one month (YF).

Mechanism	Control	RSP/DGC/ MG	Procedure	ERCI	Res	Comments
Barriers against water logged old workings failing under hydrostatic pressure causing inrush of water in underground workings.	Ensure maintenance of barrier as prescribed under mining laws.	Reg151(3).	Formulate and implement a work scheme to ensure maintenance of barrier as prescribed under mining laws.	Med	AM & MM.	System to be put in place within one month (YF).
Sudden inrush of water from old water logged workings of same seam or from one seam to another seam in underground due to accidental connection.	Ensure leaving prescribed barrier as per the provisions of the statute from old water logged workings while advancing mine galleries in underground.	Reg151(3).	Conduct periodic mine survey and check survey to ensure maintenance of barrier as prescribed under mining laws.	Med	SURO/ SUR, AM & MM.	Work to be completed within one month (YF).

Table: 8

Sample worksheet (Audit of Hazard Identification and Control Plan: Inundation in underground coal mines)

Name of the Mine: AAA **Name of the Company:** BBB
Date Conducted: CCC
Location: DDD

Assessment Team	
Name	Designation
EEE	Mines Manager (MM)
FFF	Safety Officer (SO)
GGG	Ventilation Officer (VO)
HHH	Assistant Manager (AM)
JJJ	Survey Officer/ Surveyor (SURO/SUR)
KKK	Workman Inspector (Mining) (WMI)
LLL	Overman/ Mining Sirdar (OM/MS)
MMM	Workmen/ Safety Committee Members
Add	Add

Facilitators (may include)	
Name	Designation
PPP	Deputy Director/Director, DGMS
QQQ	Chief/ Deputy Chief/Member, ISO
RRR	Area Safety Officer
SSS	Scientist, Research Institutions
TTT	Subject Expert, Educational Institutions

Audit of Hazard identification and Control Plan as regards to inundation in multiple seam underground workings with caving/stowing.

Abbreviations: **IAF:** Immediate Action Flag; **SOP**: Standard Operating Procedure.

Hazard identification Plan:
(General comments)

Hazard Control Plan:

Mechanism	**Control**	**Procedure**	**Action Taken**	**Observations and Comments**
Failure of coal pillars due to existence of fire in underground allowing connection through subsidence cracks with shallow	1. Ensure efficient measures of controlling underground fire by trained personnel under competent supervision.	1. Devise a mechanism for fighting of underground fire in consultation with experts of an academic institute and implement the same under managerial supervision.	1. A preliminary discussion to devise a mechanism of fighting underground fire has been held with experts of an academic institute.	1. Immediate action to be initiated by the MM & Agent to put the mechanism in place (IAF).

Mechanism	Control	Procedure	Action Taken	Observations and Comments
surface rain water accumulation and flooding of underground workings.	2. Ensure drainage of rain water from large surface depression and filling up of the same.	2. Constitute a team for drainage of water from surface depression and filling up of the same, as and when required under competent supervision.	2. A team has been constituted with senior most Asst. Manager as team leader.	2. Monitoring in this regard to be done in ongoing manner by MM and Agent.
	3. Specialized training on combating underground mine fire.	3. Conduct specialized training of mine personnel on combating underground mine fire.	3. Training is yet to be conducted.	3. MM & Agent to facilitate conduct of training within one month.
Failure of embankment constructed at river bank due to heavy rain and entry of water from surface through old workings and subsidence area to underground mine workings.	1. Assess the strength and stability of embankment constructed at river bank.	1. Conduct a study for assessing strength and stability of embankment in consultation with experts of a research institute. Implement suggestions for strengthening embankment, if any, under competent supervision.	1. Discussion is in progress to engage a research institute for conducting the study.	1. Immediate action to be initiated by the MM & Agent for facilitating conduct of study and implementation of recommendations (IAF).
	2. A system of sounding warning during heavy rain and withdrawal of persons from underground if considered necessary, to be in place.	2. Devise a code of practice for warning during heavy rain, and evacuation of work persons from underground, if warranted.	2. A code of practice has been devised and being implemented.	2. Ensure implementation of the code of practice by AM & MM.
Failure of dam constructed in the connection drift between workings of two seams, causing sudden inrush of water from workings of one seam to another seam in underground.	Assess stability of dam from available records. If need be, explore the possibility of strengthening the existing dam or construction of a new dam.	a) Conduct stability assessment exercise in consultation with experts of a research/academic institute.	a) The stability assessment exercise has been conducted by the experts of an academic institute, who recommended strengthening of the existing dam.	
		b) Formulate a work process for strengthening of existing dam or construction of a new dam, if the need be and execute the same by trained personnel under competent supervision.	b) The work process has been formulated. As recommended, action for strengthening of existing dam has been initiated.	MM & Agent to complete the action for strengthening of existing dam within one month's time (IAF).

Mechanism	Control	Procedure	Action Taken	Observations and Comments
Flooding of river due to heavy rains and water finding its way to underground workings through goaf and /or mine entries.	Access rainfall data of last thirty years in the area and corresponding High Flood Level (HFL) to formulate strategy for preventing entry of water in underground workings through goaf and/or mine entries.	Formulate strategy for preventing entry of Water in the underground workings through goaf and/or mine entries and initiate action for implementing the same.	A scheme has been devised and proposed to be put in use shortly.	AM & MM to expedite implementation of the scheme (IAF).
Barriers against water logged old workings failing under hydrostatic pressure causing inrush of water in underground workings.	Ensure maintenance of barrier as prescribed under mining laws.	Formulate and implement a work scheme to ensure maintenance of barrier as prescribed under mining laws.	A work scheme has been formulated and in the process of being implemented.	AM & MM to keep a continuous watch over implementation of the system.
Sudden inrush of water from old water logged workings of same seam or from one seam to another seam in underground due to accidental connection..	Ensure leaving prescribed barrier as per the provisions of the statute from old water logged workings while advancing mine galleries in underground.	Conduct periodic mine survey and check survey to ensure maintenance of barrier as prescribed under mining laws.	A system of conducting barrier survey has been formulated and in the process of being implemented.	AM & MM to keep a continuous watch over implementation of the system.

भारत सरकार / Govt. of India
श्रम एवं रोजगार मंत्रालय
Ministry of Labour and Employment
खान सुरक्षा महानिदेशालय
Directorate General of Mines Safety
****

DGMS (Tech.) (S&T) Circular No. 06 of 2016 Dhanbad, dated 08/04/2016

To

All Owners, Agents and Managers of Coal Mines

Subject: Standards of illumination in opencast coal mines

Sir,

Abbreviations - *DGMS: Directorate General of Mines Safety; S&T Division: Science & Technology Division; DDG(HQ): Deputy Director General (Head Quarter); CIL: Coal India Limited; SCCL: Singareni Collieries Company Limited; CIMFR: Central Institute of Mining and Fuel Research; ISM: Indian School of Mines; lux: SI unit of illuminance and luminous emittance, measuring number of lumens per square metre; H: Horizontal illuminance, the measure of illuminance taken through a light meter's sensor at a horizontal position on a horizontal surface ; V: Vertical illuminance, the measure of illuminance taken through a light meter's sensor at a vertical position on a vertical surface.*

Proper illumination is desirable and can be an effective aid to tackle hazards in coal mines. Existing illumination standards are several decades old, necessitating a comprehensive review in the backdrop of recent developments in mine technology and lighting.

For appraisal of present status of illumination in coal and metalliferous mines, and formulation of draft revised standards thereof, a project was undertaken by Science & Technology Division of DGMS. As a part of the project, illumination surveys were carried out in coal and metalliferous mines. Based on the inputs derived from illumination surveys and also from international best practices, a draft illumination standard for opencast coal mines was prepared.

A meeting was convened on 17.02.2016 at DGMS, Dhanbad, under the chairmanship of Shri P. Ranganatheeswar, DDG(HQ), with a view to review and finalize the standard of lighting to be provided in the specified areas or places of opencast coal mines, earlier stipulated and specified vide Govt. Notification No. GSR-804, dated 18.06.1975, published in the Gazette of India, dated 28.06.1975, Part-III Section 3(i), also reproduced by the DGMS Circular (Legis.) No. 1/1976 under Regulation 154(2) of the Coal Mines

Regulations, 1957, in which twenty-four officials from different stake holders, like DGMS, CIL, SCCL, ISM and CIMFR participated.

After detail discussions and deliberations, the minimum illumination levels to be provided at different places of working in opencast coal mines along with general guidelines for mine lighting were suggested and finalized by the participating members, which are detailed below:

STANDARDS OF ILLUMINATION IN OPENCAST COAL MINES

Serial No.	**Places to be illuminated**	**Minimum standards of illumination to be provided (in lux)**
1	Work place of Heavy Machinery	15 H, 25 V (so as to cover depth and height through which the machine operates.)
2	Drilling operations	
	(i)Area where drilling rig works	25 V (so as to illuminate full height of the drilling rig)
	(ii)Area where drill holes exists	15 H
3	Places where manual work is done	15 H, 25 V
4	Places where loading, unloading or transfer, loading of dumpers, trucks or train is carried on (including OB Dump and Coal Stack Yard)	15 H, 15 V
5	Operators cabins of machines or mechanisms	50 H at all places of operation
6	Haul roads for Trucks and Dumpers	10 H
7	Rail haulage track in the pit	10 H
8	Roadways and foot paths from bench to bench	10 H
9	Permanent paths for use of persons employed etc.	10 H
10	In-pit Crusher/Feeder Breaker	40 H
11	Hand Picking Points	50 H
12	Conveyers	
	(a) Transfer points and drive/tail end area	40 H
	(b) Along conveyor	20 H

13	Coal Handing Plant	
	(a) Places of crushing, screening, segregation and loading/unloading	40 H
	(b) Operation points	50 H
	(c) Other places (in general)	20 H
14	Pumping Station	40 H
15	(i) Electrical Sub-station	100 H, 50 V
	(ii) Other places of operation of electrical apparatus/equipment	20 H, 20 V
16	First Aid station	50 H
17	Rest shelter	30 H
18	Workshop	100 H, 50 V
19	Parking Yard	50 H
20	General working areas as determined by the Manager in writing	10 H at the level of surface to be illuminated

Guidelines for mine illumination

1. The mine lighting should be designed and installed with proper lamps and fixtures in regard to height, orientation, spacing and reflectors or other accessories, so as to secure a uniform distribution of light on the work area for visual comfort and avoiding objectionable shadows, sharp contrasts of intensity, glare, light clutter (excessive groupings of light) and light pollution to prevent strain on the eyes of the workmen, work fatigue and medically defined stress.
2. Portable lighting shall be provided at places, where the permanent/fixed lighting is not possible.
3. At strategic locations like electric substation, and any other places as determined by the Manager, emergency lighting arrangement by separate source shall also be provided.
4. In case of haul roads, orientation of light fittings should be kept so adjusted as to have emittance of light across the road and not along the road. Where the width of haul roads is more, the lighting arrangements shall be provided either by rows of lights erected on both sides of the road or by a centrally erected row, so as to maintain illumination as per standard.

5. Lighting arrangement at working places of heavy machineries, dump/stack yard and other loading/unloading areas shall be such that the formation of dark zone is avoided.
6. Considering high mobility of hydraulic excavators, the faces/benches worked by such machineries shall, as far as practicable, be illuminated by light source of matching mobility so as to avoid chances of lag for want of shifting.
7. Dump/stack yards shall be illuminated by suitable numbers of high mast towers/light source. It shall also be ensured that adequate light reaches up to edges of the active dump.
8. For better implementation of these standards, the manager of every mine shall formulate a detailed written "Illumination Scheme", which may include an "Illumination Plan" and duties and responsibilities of key officials for the purpose.
9. In respect of any particular place or operation in a mine, where due to existence of some special conditions the manager is of the opinion that compliance as per stipulated minimum standard is not reasonably practicable, he may provide illumination in variance thereof, if he has indicated the modified minimum illumination to be provided for such place or operation, as the case may be, in the "Illumination Scheme" with proper justification for the same and submitted a copy thereof to the Regional Inspector.
10. Illumination Survey:
    (i) The manager of every mine shall arrange to conduct Lighting Survey once at least in every month to ensure adequacy of illumination.
    (ii) While making such survey, the measurement of lighting shall also be taken at the point farthest from the source of light lying within the limit of the work place or in haul road or travelling or haulage roadway, as the case may be.
    (iii) A record of every such survey shall be maintained and signed by the competent person making the survey and countersigned and dated by the manager.
11. Illumination Plan:
    (i) The manager of every mine shall ensure that an Illumination Plan, indicating the location of places, type of illuminating devices, fixtures, lamps, supports, any other devices for illumination and showing required as well as measured value of light at various places to be illuminated, is maintained. Where any area of the mine is not in use or not needed to be lighted, the same shall be clearly marked and demarcated on the plan with reasons to be recorded. The plan shall be kept signed and dated by the surveyor and the official authorized for maintaining the lighting standard and countersigned and dated by the manager.

(ii) The Illumination Plan shall be brought up to date in every month based on the monthly illumination survey and considering the current status of workings.

This circular supersedes the DGMS Circular (Legis.) No. 1/1976. Action is also being taken to forward a copy of this revised standard for notification in the Gazette of India.

All Owners, Agents and Managers of coal mines are advised to ensure strict compliance with this circular.

8.4.16

(Rahul Guha)
Director General of Mines Safety

भारत सरकार / Govt. of India
श्रम एवं रोजगार मंत्रालय
Ministry of Labour and Employment
खान सुरक्षा महानिदेशालय
Directorate General of Mines Safety
****

DGMS(Tech.) (S&T) Circular No. 07 of 2016   Dhanbad, dated 08/04/2016

To

All Owners, Agents and Managers of Coal Mines

Subject: **Standards of illumination in underground coal mines**

Sir,

Abbreviations - *DGMS: Directorate General of Mines Safety; S&T Division: Science & Technology Division; DDG(HQ): Deputy Director General (Head Quarter); CIL: Coal India Limited; SCCL: Singareni Collieries Company Limited; CIMFR: Central Institute of Mining and Fuel Research; ISM: Indian School of Mines; lux: SI unit of illuminance and luminous emittance, measuring number of lumens per square metre; H: Horizontal illuminance, the measure of illuminance taken through a light meter's sensor at a horizontal position on a horizontal surface ; V: Vertical illuminance, the measure of illuminance taken through a light meter's sensor at a vertical position on a vertical surface.*

Proper illumination is desirable and can be an effective aid to tackle hazards in coal mines. Existing illumination standards are several decades old, necessitating a comprehensive review in the backdrop of recent developments in mine technology and lighting.

For appraisal of present status of illumination in coal and metalliferous mines, and formulation of draft revised standards thereof, a project was undertaken by Science & Technology Division of DGMS. As a part of the project, illumination surveys were carried out in coal and metalliferous mines. Based on the inputs derived from illumination surveys and also from international best practices, a draft illumination standard for underground coal mines was prepared.

A meeting was convened on 17.02.2016 at DGMS, Dhanbad, under the chairmanship of Shri P. Ranganatheeswar, DDG(HQ), with a view to review and finalize the existing guidelines issued on standards of illumination under regulation Reg.151 of Coal Mines Regulations, 1957 vide DGMS circular No. 14/1964 for underground coal mines, in which twenty-four officials from different stakeholders, like DGMS, CIL, SCCL, ISM and CIMFR participated.

After detail discussions and deliberations, the minimum illumination levels to be provided at different places of working in underground coal mines along with general guidelines for mine lighting were suggested and finalized by the participating members, which are detailed below:

STANDARDS OF ILLUMINATION IN UNDERGROUND MINES

S.N	**Important places to be illuminated**	**Minimum level of illumination to be provided (in lux)**
1	At every shaft landing and shaft bottom or siding which is in regular use	50 H
2	Travelling roadway and Haulage road way, including Man-riding roadway and every incline in use	10 H, 10 V
3	Haulage Roadway (junctions) at which tubs are coupled or uncoupled	30 H
4	At every places of loading and unloading	30 H, 20 V
5	At every room and place containing any engine, motor or other apparatus in regular use	30 H
6	Any working face and Goaf Edges of depillaring panels	20 H, 30 V
7	Ladder way/Man way	15 H
8	Pumping Station	30 H
9	Area under filling /stowing	10 H
10	Conveyors	
	(i) Transfer points and drive/tail end area	40 H
	(ii) Along conveyor	20H
11	Hand picking points	50 H
12	Loco charging station	50 H
13	Underground Garage/workshop	50 H
14	(i) Electrical substation	100 H, 50 V
	(ii) Other places of operation of electrical apparatus/equipment	20 H, 20 V

15	At every First –aid station	50 H
16	Miners station/ Rest shelter	25 H
17	Coal Handing Plant	
	(i) Places of crushing, screening, segregation and loading/unloading	40 H
	(ii) Operation points	50 H
	(iii) Other places (in general)	20 H
18	workshop at surface	100 H, 50 V
19	General working areas as determined by the Manager in writing	10 H at the level of surface to be illuminated

Guidelines for mine illumination

1. The mine lighting should be designed and installed with proper lamps and fixtures in regard to height, orientation, spacing and reflectors or other accessories, so as to secure a uniform distribution of light on the work area for visual comfort and avoiding objectionable shadows, sharp contrasts of intensity, glare, light clutter (excessive groupings of light) and light pollution to prevent strain on the eyes of the workmen, work fatigue and medically defined stress.
2. Portable lighting shall be provided at places, where the permanent/fixed lighting is not possible.
3. At strategic locations like electric substation, winding engine room and any other places as determined by the Manager, emergency lighting arrangement by separate source shall also be provided.
4. For better implementation of these standards, the manager of every mine shall formulate a detailed written "Illumination Scheme", which may include an "Illumination Plan" and duties and responsibilities of Key officials for the purpose.
5. In respect of any particular place or operation in a mine, where due to existence of some special conditions the manager is of the opinion that compliance as per stipulated minimum standard is not reasonably practicable, he may provide illumination in variance thereof, if he has indicated the modified minimum illumination to be provided for such place or operation, as the case may be, in the "Illumination Scheme" with proper justification for the same and submitted a copy thereof to the Regional Inspector.
6. Illumination Survey:
    (i) The manager of every mine shall arrange to conduct Lighting Survey once at least in every month to ensure adequacy of illumination.

- (ii) While making such survey, the measurement of lighting shall also be taken at the point farthest from the source of light lying within the limit of the roadways and work place, as the case may be.
- (iii) A record of every such survey shall be maintained and signed by the competent person making the survey and countersigned and dated by the manager.

7. Illumination Plan:
   - (i) The manager of every mine shall ensure that an Illumination Plan, indicating the location of places, type of illuminating devices, fixtures, lamps, supports, any other devices for illumination and showing required as well as measured value of light at various places to be illuminated, is maintained. Where any area of the mine is not in use or not needed to be lighted, the same shall be clearly marked and demarcated on the plan with reasons to be recorded. The plan shall be kept signed and dated by the surveyor and the official authorized for maintaining the lighting standard and countersigned and dated by the manager.
   - (ii) The Illumination Plan shall be brought up to date in every month based on the monthly illumination survey and considering the current status of workings.

In addition to the above, the roof and sides of the aforesaid places belowground shall also be kept effectively whitewashed as required under Reg. 150 of Coal Mines Regulations, 1957 or such other corresponding regulations which may come into force in future, which would further help in significantly improving the underground visual environment and level of illumination.

This circular supersedes the DGMS circular No. 14/1964.

All Owners, Agents and Managers of coal mines are advised to ensure compliance with this circular.

8·4·16
(Rahul Guha)
Director General of Mines Safety

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Ministry of Labour and Employment
खान सुरक्षा महानिदेशालय
Directorate General of Mines Safety
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DGMS (Tech.) (S&T) Circular No. 08 of 2016 **Dhanbad, dated 03/05/2016**

To

All Owners, Agents and Managers of Coal Mines

Subject: Emergency Management Plan for Indian coal and metal mines

Sir,

Abbreviations *- DGMS: Directorate General of Mines Safety; CIL: Coal India Limited; SCCL: Singareni Collieries Company Limited; CIMFR: Central Institute of Mining and Fuel Research; ISM: Indian School of Mines; MOIL: Manganese Ore India Limited; UCIL: Uranium Corporation of India Limited; HCL: Hindustan Copper Limited; HZL: Hindustan Zinc Limited; HINDALCO: Hindalco Industries Limited; SAIL: Steel Authority of India Limited.*

Regulation 199A of the Coal Mines Regulations'1957 & Regulation 190A of the Metalliferous Mines Regulations'1961 stipulates preparation of an emergency plan for every mine having workings belowground for use in time of emergency. The emergency plan shall incorporate provision for mock rehearsals at regular intervals.

Recently, a DGMS (Tech.) (S&T) Circular no.05 dated 2nd April 2016 was issued, detailing an integrated approach for development of Safety Management Plan for coal and metalliferous mines and also underlining the concept of emergency exercise.

On 22nd April 2016, a workshop on "Emergency Preparedness and Response System" was organized at DGMS, Dhanbad, for facilitating discussion and deliberations on recent developments in emergency management in mines and suggests inputs for drawing up a roadmap to effect a qualitative improvement in the system in vogue. Eighty five mine safety & rescue experts from different stakeholders like CIL, SCCL, HCL, MOIL, HINDALCO, Tata Steel, SAIL, UCIL, ISM, CIMFR and DGMS participated in the workshop.

Based on the simulated emergency exercises conducted by DGMS and inputs gathered from the workshop, a guideline for developing emergency management plan for Indian coal and metal mines is enclosed as Appendix.

All Owners, Agents and Managers of coal & metalliferous mines are advised to ensure compliance with this circular.

3.5.16

(Rahul Guha)
Director General of Mines Safety

Appendix to DGMS (Tech.) (S&T) Circular No.08 of 2016, dated 03/05/ 2016

1. Introduction

Scenario planning & Hypothesis testing exercise may be conducted to consider different hypothetical (but likely) scenario of mine emergencies vis-à-vis barriers to prevent, in the backdrop of risk assessment and initiated hazard control measures. Mine officials of neighboring mines with decent exposure to risk assessment process may be engaged to conduct the exercise with facilitation by experts.

During interaction sessions efforts would be made to search for solutions/controls of possible hazards and risks that may not have been previously identified.

One of the critical decisions to be made following an emergency is the classification of that event to initiate appropriate level of response. Often it has been observed that several events, some resulting in multi fatalities, could not be designated as emergencies promptly enough, thus critically delaying the initiation of appropriate responses. The management and control of any event, whether involving one or several persons, is always best controlled through an effective and automatic response plan initiated at the earliest possible time.

2. Trigger action response plan and emergency initiation protocol

Regular inspections are to be made as per the established protocol to identify the possible sources of hazards and initiate remedial measures by activating mechanism of control/elimination. Taking due account of situations prevailing at mine site, 'Trigger Action Response Plans' (TARP's) and 'Emergency Initiation Protocols' (EIP's) need to be devised, for each level in the order of their seriousness and gravity.

3. Self rescue and aided rescue

Objective evidence gathered during the course of conducting emergency exercises worldwide demonstrated that adoption of self-escape philosophy offers the best chance of survival to the underground personnel, when ably supported by an aided rescue strategy, which provides for external assistance to those persons unable to reach a place of safety, unaided. Ingraining the philosophy, an action plan for formulation of an emergency management plan (EMP) has been illustrated in Figure -1 for Indian mines.

4. Simulated emergency exercise

The structure of the simulated emergency exercise may be envisaged encompassing following features in view:

- Systematic and consistent with the concept of mutual assistance from other mines;
- Directly addresses the risks prevailing at the mine;
- Inclusive of external agencies such as mines rescue station, DGMS, senior company officials, district administration, medical services and media representatives;
- Incorporates an assessment and evaluation process;
- In tune with risk assessment principles to ensure that the exercises do not introduce new safety risks to persons at a mine

The main function of aided rescue is to provide external assistance to those work persons unable to reach a place of safety, on their own. The main features of an aided rescue protocol are furnished below:

- Incident management teams; formation thereof, placement of a code detailing roles, responsibilities and authorities of persons engaged in the exercise and inclusion of such details in duty cards, which are essential tools that act as critical memory prompts and provide a valuable recording and reporting function. It is also imperative to set up verifiable communication channels for accurate and timely flow of information, both on and off side.

- Control room set up; may include among others, the following:

Requisite facilities for recording and analysis of data; ready availability of external expert assistance of academic and research institutions; and, an efficient electronic communication system for in-mine as well as external communication.

- Mine rescue organizations; essential features are:

Efficient management, manned by a team of dedicated and competent personnel. Comprehensive mine rescue protocols and guidelines need to be in place. A well coordinated and structured system of training and retraining of rescue personnel is a necessary component of any mine rescue management system.

5. Barriers to re-entry

Initiation of a process of hazard analysis and risk assessment is an essential pre-requisite to the event of re-entry. Thereafter, barriers to re-entry may be critically examined and evaluated and recovery be effected as per devised rescue protocols and guidelines.

6. Simulated emergency exercise at Coal Mine- A & Coal Mine- B

Two emergency exercises were conducted at Coal Mine-A and Coal Mine-B to assess the emergency preparedness and response systems in Indian coal mines.

6.1 Observations

In general, all coal mine personnel were committed to the exercise and the underground workers participated fully and in good spirit under difficult circumstances. All workers reached places of safety in good time in Coal Mine – A, whereas 12 persons at Coal Mine – B could not. Samples of (a) exercise event log and (b) assessment data sheets are enclosed for reference.

The outcome of the exercise, summarized below, also very clearly underlined the fact that there are ample opportunities for inducing a qualitative and quantitative improvement in the existing scenario:

- Majority of work persons were not able to don their self rescuer's correctly;

- Little efforts were made by workmen to communicate their circumstances to surface;
- There were little deliberations/planning among the team members before commencing their evacuation, which resulted in non-adoption of defined order of travel, agreed route of travel, means to ensure they stayed together;
- Some teams had no gas monitoring equipment and others who possessed them, left the instruments in hurry while evacuating;
- The teams did not make any efforts to ascertain the atmospheric conditions and was not in a position to evaluate the degree of danger to which they are exposed even after donning the self rescuer's which was of 30 minutes duration;
- There was little, if any discernable ventilation flow to assist the teams in directional orientation;
- Escape ways were not maintained properly and contained numerous trip hazards & obstructions;
- In poor visibility, signs posted in primary escape ways were of little or no use;
- Alternative escape routes were not sign posted;
- Not all team leaders (overman/mining sirdar) were carrying hand plans;
- There was an urgent need for:
  - developing awareness among work persons about the hazards and implications of the underground mine fires;
  - training the work persons in the prevention and combat of underground mine fires;
- There was considerable under estimation of expected evacuation/travel times at Coal Mine – A;
- Fire fighting capabilities and resources available at Coal Mine – B needs urgent review; and
- The main rescue van was under repair and the backup rescue van was not in full standby mode at Coal Mine – A.

7. Recommendations

Based on the inferences drawn from the review of existing practices and conducted simulated emergency exercises, it is suggested that the following issues may be kept in perspective while formulating an emergency response management scheme:

a) Consequent upon Risk assessment exercise, control measures may be formulated detailing responsibility of concerned mine officials with a protocol of implementation, to obviate the possibilities of dangerous occurrence in a coal mine.

b) Scenario planning & hypothesis testing sessions may be conducted to search for possible solutions/controls of hazards and risks which may have not been previously identified.

c) Details of ventilation net works with airflows and quantity may be incorporated in ventilation plan.

d) A schedule of training and re-training need to be drawn up for all persons on the correct donning and wearing procedures for self rescuers.

e) Use of gas chromatography equipment need to be considered for mine gas analysis purposes.

f) Current standing orders be reviewed with a view to incorporate concepts like developing trigger action response plans to establish specific trigger points.

g) Release of stink gas as a mode of emergency initiation protocol need to be considered to advise all work persons in the mine, particularly those without easy access to telecommunication system of an order of evacuation.

h) Establishment of procedures detailing standard methods for deciding plans/options with work persons prior to evacuation, including routes of travel, modes of travel, order of travel, use of link lines, communications, signaling, etc.

i) Primary and secondary escape routes be established and maintained. The escape ways may be fitted with guide ropes, clearly sign posted and facilities like fluorescent droppers, embossed printing be used to make them identifiable in poor visibility.

j) In each working district, places need to be identified where workmen can gather in the event of an emergency. Such places are to be equipped with telephones, mine plans, link lines and blind –man walking sticks.

k) Development of duty cards that individually detail the expected roles, responsibilities and authorities of all persons in charge of coordinating and/or controlling an emergency response, which may be kept at a number of designated places around the mine site.

l) The construction of 'refuse chamber' need to be given a serious consideration to mitigate the hazards associated with extensive workings and steep gradient in coal mines like Coal Mine-B.

m) A comprehensive re-training program may be put in place to raise the awareness of work persons on the circumstances to be expected in the vicinity of an underground fire. Additional training should be conducted on the options available to combat underground fires and the risks and hazards associated with each.

(Rahul Guha) 3.5.16
Director General of Mines Safety

SAMPLE EMERGENCY EXERCISE EVENT LOG

Coal Mine – A

START TIME	EVENTS	ELAPSED TIME
11:40	Assessment team in lower Seam advise workers of thick choking smoke entering their workplace.	**0:00**
11:45	Assessment team in upper Seam advise workers of thick choking smoke entering their workplace.	**0:05**
11:50	Mine workers donned Self Rescuers and commenced evacuation.	**0:10**
11.54	Sirdar from Escaping team 1 advised surface of circumstances.	**0:14**
11:58	Acting Manager telephones Mines Rescue Brigade.	**0:18**
12:03	Escaping team 3 arrive at pit-bottom (shaft).	**0:23**
12:05	One worker each from Escaping teams 1 and 2 simulate collapse (unconscious) from carbon monoxide poisoning.	**0:25**
12:05	Escaping team 4 arrive at pit-bottom (shaft).	**0:25**
12:08	Mines Rescue Brigade ready to leave station – six persons, fully equipped.	**0:28**
12:09	Escaping teams 1 and 2 arrive at pit-bottom (shaft) and contact the Onsetter and the surface Banksman. Escaping teams 1 & 2 demanded cage to complete evacuation to surface.	**0:29**
12:11	Escaping team 3 & 4 demanded cage to complete evacuation to surface.	
12:13	Ambulance arrives on surface.	**0:33**
12:15	Escaping team 1 & 2 arrived at surface Attendance Cabin.	**0:35**
12:30	Escaping team 3 & 4 arrived at surface Attendance Cabin.	
12:38	Exercise Terminated.	**0:58**

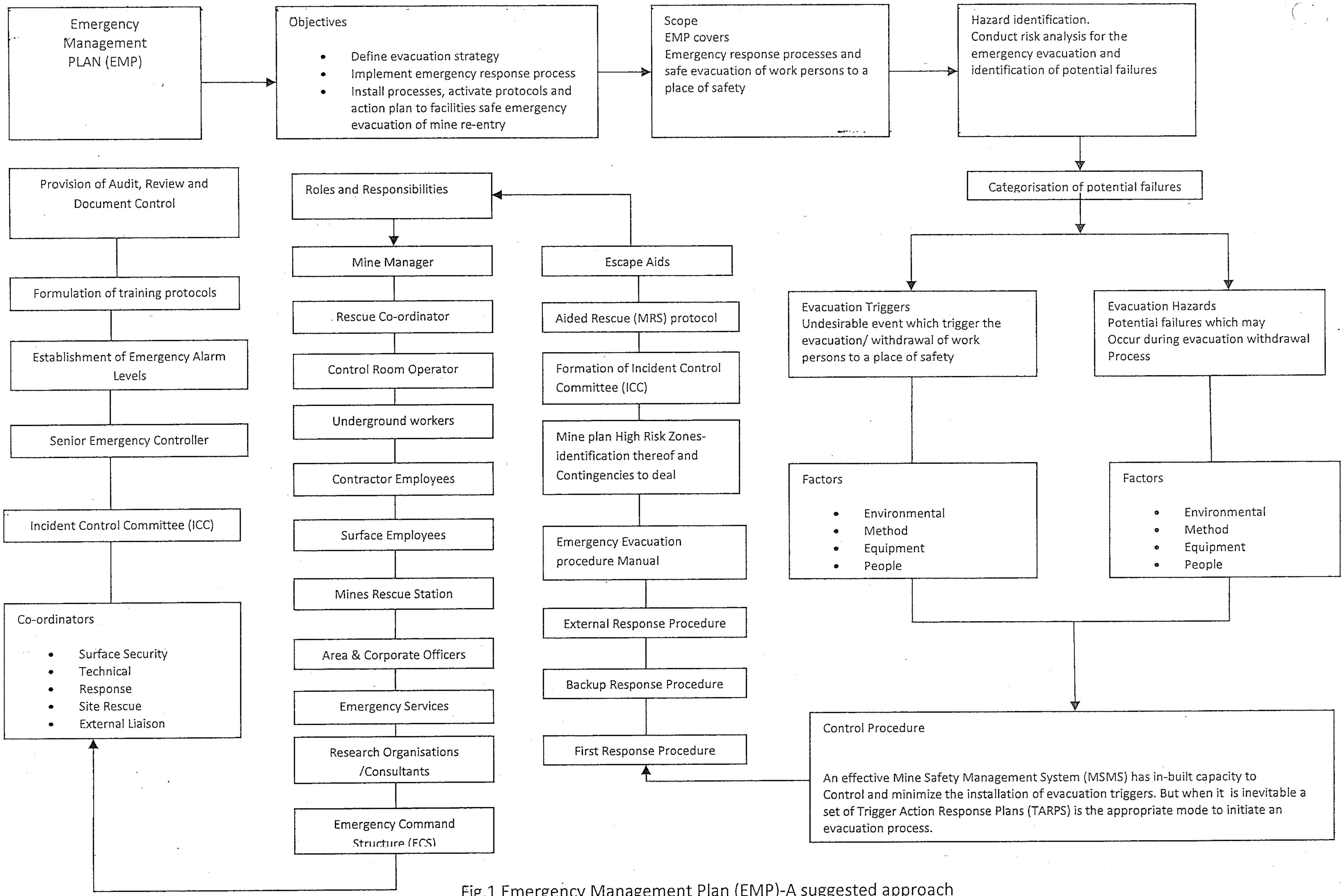
Emergency Management PLAN (EMP)
Objectives
Define evacuation strategy
Implement emergency response process
Install processes, activate protocols and action plan to facilities safe emergency evacuation of mine re-entry
Scope
EMP covers
Emergency response processes and safe evacuation of work persons to a place of safety
Hazard identification.
Conduct risk analysis for the emergency evacuation and identification of potential failures
Categorisation of potential failures
Evacuation Triggers
Undesirable event which trigger the evacuation/ withdrawal of work persons to a place of safety
Evacuation Hazards
Potential failures which may Occur during evacuation withdrawal Process
Factors
Environmental
Method
Equipment
People
Factors
Environmental
Method
Equipment
People
Control Procedure
An effective Mine Safety Management System (MSMS) has in-built capacity to Control and minimize the installation of evacuation triggers. But when it is inevitable a set of Trigger Action Response Plans (TARPS) is the appropriate mode to initiate an evacuation process.
First Response Procedure
Backup Response Procedure
External Response Procedure
Emergency Evacuation procedure Manual
Mine plan High Risk Zones-identification thereof and Contingencies to deal
Formation of Incident Control Committee (ICC)
Aided Rescue (MRS) protocol
Escape Aids
Roles and Responsibilities
Mine Manager
Rescue Co-ordinator
Control Room Operator
Underground workers
Contractor Employees
Surface Employees
Mines Rescue Station
Area & Corporate Officers
Emergency Services
Research Organisations /Consultants
Emergency Command Structure (ECS)
Co-ordinators
Surface Security
Technical
Response
Site Rescue
External Liaison
Incident Control Committee (ICC)
Senior Emergency Controller
Establishment of Emergency Alarm Levels
Formulation of training protocols
Provision of Audit, Review and Document Control

Fig.1 Emergency Management Plan (EMP)-A suggested approach

Coal Mine – A **Sample assessment sheet (Emergency evacuation): Team 4 at 35 Stopping, lower Seam**

Assessors: Three officials (Coal company – one; International Expert-one; DGMS -one)

ELEMENT	PERFORMANCE CRITERIA	OBJECTIVE EVIDENCE SOUGHT	OBSERVATION
Information about the emergency circumstance to the Sirdar present at 35 stopping of lower seam. [*Information given by the Assessor at 11.45am.*]	Thick Choking Smoke coming down intakes.	Recognition of changed circumstances.	# Mining Sirdar immediately stopped working and started evacuating. # Counted number of workmen present in the workplace. # Sirdar did not cross-check the information.
Mine workers to be notified by Sirdar about the incident.	❖ All mine workers were notified and accounted for; and ❖ Mine workers marshaled together.	❖ Location of outbye workers considered; and ❖ Log times.	# All Mine workers were located & accounted for. They were marshaled together within 8 minutes. # Efforts were not made to inform mine workers located in the outbye area.
Mine atmosphere and evacuation strategy. [*Assessor informed that:* ❖ *Canary birds were found unconscious;* ❖ *Nil methane observed, and* ❖ *Flame safety lamp still burning*]	Understanding the situation and recognition of the risks while evacuation.	❖ Ability to identify risks and chalk out evacuation plan accordingly; ❖ Team discussion initiated by the leader to consider options for evacuation and decide route of travel; and ❖ Use of devices and methods to assess the atmospheric condition while evacuation.	# Lack of understanding displayed by Sirdar. # No time logged while evacuating. # Sirdar did not discuss about the options for safe evacuation and decided the route of evacuation. # No briefing provided to crew by the Sirdar about expected route of travel, method of travel or method to ensure no-one is left behind. # While evacuating, checking of atmospheric conditions by methanometer and flame safety lamp was not carried out by the Sirdar.
Donning of Self Rescuers and its applicability under present circumstances.	❖ Self rescuers fitted correctly; and ❖ Fitted in sufficient time.	Recognition of expected duration of evacuation vis-à-vis working life of self rescuers.	# Self rescuers donned in two minutes time. Three crew members put self rescuers on satisfactorily, and two crew members put head straps on over helmets. # Life of self rescuer vis-à-vis travel time was not assessed by Sirdar before commencing evacuation.
Incident Equipment. [*May be carried by workmen & Sirdar.*]	What extra equipment is taken *[Put smoke glasses on all crew members and one assessor.]* *[Supply blind man canes]*	Record equipment taken	Sirdar carried methanometer and flame safety lamp.

Sirdar to contact Surface control on phone.	❖ Describe circumstances; ❖ Inform about number of workmen accounted for; and ❖ Expected route of travel.	❖ Provide complete and correct information; and ❖ Log times.	Sirdar could not contact surface as no phone was available for the purpose.
Route of travel. [*To be decided by the Sirdar after studying the mine plan and deliberation with team members.*]	❖ Appropriate means decided; ❖ All workmen traveled together; ❖ Pace of travel appropriate; ❖ Correct escape route was followed; ❖ Use of blind-man canes; and ❖ Use of link-lines	❖ Monitor and record significant incidents; and ❖ Log times.	# The team led by Sirdar commenced evacuation at 11.47 am. # No discussion was held about method or route of travel. # No discussion was held on order of travel i.e. who should lead – who to follow last, how to stick together. # Lead person changed four times as team members walked past each other. # Workers were acquainted with escape route. # Speed of travel was satisfactory. # Body contact between some workers was excellent – others walked on their own. # Obstructions along escape route were navigated well. # Contact with team members was maintained by "humming" through mouthpieces.
Action at Pit bottom (shaft).	❖ Contact made with On-setter; and ❖ Contact made with Banksman/Surface officials.	❖ Correct Information passed on; and ❖ Log times.	The team established contact with onsetter at 12.34 pm, and thereafter made contact with Banksman /Officials present at the surface.
Actions on surface.	❖ Contact made with attendance clerk; and ❖ De-briefing.	❖ Accounting of workmen who exited the mine after emergency; and ❖ Debriefing – record information sought and passed on.	# Workmen led by Sirdar marked out and accounted for by the attendance clerk in the attendance register. # Debriefing of Sirdar and team members were done by a team of assessors. While some team members exhibited a fair understanding, yet in general, there exist critical gaps in the implementation module of emergency preparedness and response system of the mine.

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Directorate General of Mines Safety

No. DGMS (Tech) Circular (MAMID)/ 09 Dhanbad, dated: 08 / 06 /2016

To

The Owner, Agent and Manager of All Mines

Subject: Online maintenance of registers/records mandated by the Mines Act, 1952 and allied legislation by mines.

Sir,

As you are aware that the Mines Act, 1952 and allied legislation mandate maintenance of physical registers and documents by mines. These registers and records have to be produced/made available to the inspectors/authorities during the inspection of the mine or on other occasions as per law. In this context, it is observed that digitization of these Registers and other documents has the potential to achieve large productivity improvement, both in terms of simplifying processes and data management as well as improving the ease of monitoring by Directorate General of Mines Safety (DGMS) and other regulatory authorities.

Moreover, Section 4 of the Information Technology Act, 2000, provides that "where any law provides that information or any other matter shall be in writing or in the typewritten or printed form, then notwithstanding anything contained in such law, such requirement shall be deemed to have been satisfied if such information or matter is rendered or made available in an electronic form; and accessible so as to be usable for a subsequent reference". In view of this provision, it has been decided that that if any mine management makes available such registers/records in electronic form and accessible to the inspector/authority so as to be usable for a subsequent reference, then that mine management need not be required to produce print/hard copy of these registers, records or documents.

Thus, it has been decided to move towards a regime of online maintenance of registers/records mandated by the Mines Act, 1952 and allied legislation, by mine and integrate the same with the Shram Suvidha Portal so that the information is available on real time to both the mine management as well as the DGMS. As a first step to move in this direction, it is required to have all registers/documents maintained in digital/electronic form.

Yours faithfully,

8.6.16

(Rahul Guha)

Director General of Mines Safety

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DGMS(Tech.) Circular No. 10 of 2016 **Dhanbad, dated 27/06/2016**

To

All Owners, Agents and Managers of Metallferous Mines

Subject: **Standards of illumination in underground metalliferous mines**

Sir,

Abbreviations *- DGMS: Directorate General of Mines Safety; S&T Division: Science & Technology Division; DDG(HQ): Deputy Director General (Head Quarter); CIL: Coal India Limited; SCCL: Singareni Collieries Company Limited; CIMFR: Central Institute of Mining and Fuel Research; ISM: Indian School of Mines; lux: SI unit of illuminance and luminous emittance, measuring number of lumens per square metre; H: Horizontal illuminance, the measure of illuminance taken through a light meter's sensor at a horizontal position on a horizontal surface ; V: Vertical illuminance, the measure of illuminance taken through a light meter's sensor at a vertical position on a vertical surface.*

Proper illumination is desirable and can be an effective aid to tackle hazards in metalliferous mines. The minimum standards of illumination to be provided at different places of working in underground metalliferous mines assume significance in the backdrop of recent developments in mine technology and lighting.

For appraisal of present status of illumination in metalliferous and coal mines, and formulation of minimum standards thereof, a project was undertaken by Science & Technology Division of DGMS. As a part of the project, illumination surveys were carried out in coal and metalliferous mines.

Based on the inputs derived from illumination surveys, international best practices and a meeting of different stakeholders held on 17.02.2016, the minimum standards of illumination to be provided at different places of working in underground metalliferous mines along with general guidelines for mine lighting were finalized, which are detailed below:

STANDARDS OF ILLUMINATION IN UNDERGROUND METALLIFEROUS MINES

S.N	Place/Area to be illuminated	Minimum level of illumination to be provided (in lux)
1	At every shaft landing and shaft bottom or siding which is in regular use	50 H
2	Travelling roadway and Haulage road way, including Man-riding roadway and every incline in use	10 H, 10 V
3	Haulage Roadway (junctions) at which tubs are coupled or uncoupled	30 H
4	At every places of loading and unloading	30 H, 20 V
5	At every room and place containing any engine, motor or other apparatus in regular use	30 H
6	Any working face and stopes	20 H, 30 V
7	Ladder way/Man way	15 H
8	Pumping Station	30 H
9	Area under filling /stowing	10 H
10	Conveyors	
	(i) Transfer points and drive/tail end area	40 H
	(ii) Along conveyor	20H
11	Hand picking points	50 H
12	Loco charging station	50 H
13	Underground Garage/workshop	50 H
14	(i) Electrical substation	100 H, 50 V
	(ii) Other places of operation of electrical apparatus/equipment	20 H, 20 V
15	At every First –aid station	50 H
16	Miners station/ Rest shelter	25 H

17	Mineral Handling Plant	
	(i) Places of crushing, screening, segregation and loading/unloading	40 H
	(ii) Operation points	50 H
	(iii) Other places (in general)	20 H
18	workshop at surface	100 H, 50 V
19	General working areas as determined by the Manager in writing	10 H at the level of surface to be illuminated

Guidelines for mine illumination

1. The mine lighting should be designed and installed with proper lamps and fixtures in regard to height, orientation, spacing and reflectors or other accessories, so as to secure a uniform distribution of light on the work area for visual comfort and avoiding objectionable shadows, sharp contrasts of intensity, glare, light clutter (excessive groupings of light) and light pollution to prevent strain on the eyes of the workmen, work fatigue and medically defined stress.
2. Portable lighting shall be provided at places, where the permanent/fixed lighting is not possible.
3. At strategic locations like electric substation, winding engine room and any other places as determined by the Manager, emergency lighting arrangement by separate source shall also be provided.
4. For better implementation of these standards, the manager of every mine shall formulate a detailed written "Illumination Scheme", which may include an "Illumination Plan" and duties and responsibilities of Key officials for the purpose.
5. In respect of any particular place or operation in a mine, where due to existence of some special conditions the manager is of the opinion that compliance as per stipulated minimum standard is not reasonably practicable, he may provide illumination in variance thereof, if he has indicated the modified minimum illumination to be provided for such place or operation, as the case may be, in the "Illumination Scheme" with proper justification for the same and submitted a copy thereof to the Regional Inspector.
6. Illumination Survey:
    (i) The manager of every mine shall arrange to conduct Lighting Survey once at least in every month to ensure adequacy of illumination.
    (ii) While making such survey, the measurement of lighting shall also be taken at the point farthest from the source of light lying within the limit of the roadways and work place, as the case may be.

   (iii) A record of every such survey shall be maintained and signed by the competent person making the survey and countersigned and dated by the manager.

7. Illumination Plan:
   (i) The manager of every mine shall ensure that an Illumination Plan, indicating the location of places, type of illuminating devices, fixtures, lamps, supports, any other devices for illumination and showing required as well as measured value of light at various places to be illuminated, is maintained. Where any area of the mine is not in use or not needed to be lighted, the same shall be clearly marked and demarcated on the plan with reasons to be recorded. The plan shall be kept signed and dated by the surveyor and the official authorized for maintaining the lighting standard and countersigned and dated by the manager.
   (ii) The Illumination Plan shall be brought up to date in every month based on the monthly illumination survey and considering the current status of workings.

In addition to the above, the roof and sides of the aforesaid places belowground shall also be kept effectively whitewashed, which would further help in significantly improving the underground visual environment and level of illumination.

All Owners, Agents and Managers of metalliferous mines are advised to ensure compliance with this circular.

(Rahul Guha) 27.6.18
Director General of Mines Safety

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Directorate General of Mines Safety

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DGMS(Tech.) Circular No. 11 of 2016 **Dhanbad, dated 27/06/2016**

To

All Owners, Agents and Managers of Metallferous Mines

Subject: Standards of illumination in opencast metalliferous mines

Sir,

Abbreviations - *DGMS: Directorate General of Mines Safety; S&T Division: Science & Technology Division; DDG(HQ): Deputy Director General (Head Quarter); CIL: Coal India Limited; SCCL: Singareni Collieries Company Limited; CIMFR: Central Institute of Mining and Fuel Research; ISM: Indian School of Mines; lux: SI unit of illuminance and luminous emittance, measuring number of lumens per square metre; H: Horizontal illuminance, the measure of illuminance taken through a light meter's sensor at a horizontal position on a horizontal surface ; V: Vertical illuminance, the measure of illuminance taken through a light meter's sensor at a vertical position on a vertical surface.*

Proper illumination is desirable and can be an effective aid to tackle hazards in metalliferous mines. Existing illumination standards are several decades old, necessitating a comprehensive review in the backdrop of recent developments in mine technology and lighting.

For appraisal of present status of illumination in opencast metalliferous and coal mines, and formulation of draft revised standards thereof, a project was undertaken by Science & Technology Division of DGMS. As a part of the project, illumination surveys were carried out in opencast metalliferous and coal mines.

Based on the inputs derived from illumination surveys, international best practices and a meeting of different stakeholders held on 17.02.2016, the minimum standards of illumination to be provided at different places of working in opencast metalliferous mines along with general guidelines for mine lighting were finalized which are detailed below:

STANDARDS OF ILLUMINATION IN OPENCAST METALLIFEROUS MINES

Serial No.	Place/Area to be illuminated	Minimum standards of illumination to be provided (in lux)
1	Work place of Heavy Machinery	15 H, 25 V (so as to cover depth and height through which the machine operates.)
2	Drilling operations	
	(i)Area where drilling rig works	25 V (so as to illuminate full height of the drilling rig)
	(ii)Area where drill holes exists	15 H
3	Places where manual work is done	15 H, 25 V
4	Places where loading, unloading or transfer, loading of dumpers, trucks or train is carried on (including OB Dump and Mineral/Ore Stack Yard)	15 H, 15 V
5	Operators cabins of machines or mechanisms	50 H at all places of operation
6	Haul roads for Trucks and Dumpers	10 H
7	Rail haulage track in the pit	10 H
8	Roadways and foot paths from bench to bench	10 H
9	Permanent paths for use of persons employed etc.	10 H
10	In-pit Crusher/Feeder Breaker	40 H
11	Hand Picking Points	50 H
12	Conveyers	
	(a) Transfer points and drive/tail end area	40 H
	(b) Along conveyor	20 H

13	Mineral/Ore Handling Plant	
	(a) Places of crushing, screening, segregation and loading/unloading	40 H
	(b) Operation points	50 H
	(c) Other places (in general)	20 H
14	Pumping Station	40 H
15	(i) Electrical Sub-station	100 H, 50 V
	(ii) Other places of operation of electrical apparatus/equipment	20 H, 20 V
16	First Aid station	50 H
17	Rest shelter	30 H
18	Workshop	100 H, 50 V
19	Parking Yard	50 H
20	General working areas as determined by the Manager in writing	10 H at the level of surface to be illuminated

Guidelines for mine illumination

1. The mine lighting should be designed and installed with proper lamps and fixtures in regard to height, orientation, spacing and reflectors or other accessories, so as to secure a uniform distribution of light on the work area for visual comfort and avoiding objectionable shadows, sharp contrasts of intensity, glare, light clutter (excessive groupings of light) and light pollution to prevent strain on the eyes of the workmen, work fatigue and medically defined stress.
2. Portable lighting shall be provided at places, where the permanent/fixed lighting is not possible.
3. At strategic locations like electric substation, and any other places as determined by the Manager, emergency lighting arrangement by separate source shall also be provided.
4. In case of haul roads, orientation of light fittings should be kept so adjusted as to have emittance of light across the road and not along the road. Where the width of haul roads is more, the lighting arrangements shall be provided either by rows of lights erected on both sides of the road or by a centrally erected row, so as to maintain illumination as per standard.

5. Lighting arrangement at working places of heavy machineries, dump/stack yard and other loading/unloading areas shall be such that the formation of dark zone is avoided.
6. Considering high mobility of hydraulic excavators, the faces/benches worked by such machineries shall, as far as practicable, be illuminated by light source of matching mobility so as to avoid chances of lag for want of shifting.
7. Dump/stack yards shall be illuminated by suitable numbers of high mast towers/light source. It shall also be ensured that adequate light reaches up to edges of the active dump.
8. For better implementation of these standards, the manager of every mine shall formulate a detailed written "Illumination Scheme", which may include an "Illumination Plan" and duties and responsibilities of Key officials for the purpose.
9. In respect of any particular place or operation in a mine, where due to existence of some special conditions the manager is of the opinion that compliance as per stipulated minimum standard is not reasonably practicable, he may provide illumination in variance thereof, if he has indicated the modified minimum illumination to be provided for such place or operation, as the case may be, in the "Illumination Scheme" with proper justification for the same and submitted a copy thereof to the Regional Inspector.
10. Illumination Survey:
    (i) The manager of every mine shall arrange to conduct Lighting Survey once at least in every month to ensure adequacy of illumination.
    (ii) While making such survey, the measurement of lighting shall also be taken at the point farthest from the source of light lying within the limit of the work place or in haul road or travelling or haulage roadway, as the case may be.
    (iii) A record of every such survey shall be maintained and signed by the competent person making the survey and countersigned and dated by the manager.
11. Illumination Plan:
    (i) The manager of every mine shall ensure that an Illumination Plan, indicating the location of places, type of illuminating devices, fixtures, lamps, supports, any other devices for illumination and showing required as well as measured value of light at various places to be illuminated, is maintained. Where any area of the mine is not in use or not needed to be lighted, the same shall be clearly marked and demarcated on the plan with reasons to be recorded. The plan shall be kept signed and dated by the surveyor and the official authorized for maintaining the lighting standard and countersigned and dated by the manager.

(ii) The Illumination Plan shall be brought up to date in every month based on the monthly illumination survey and considering the current status of workings.

This circular supersedes the DGMS Circular (Legis.) No. 3/1976. Action is also being taken to forward a copy of this revised standard for notification in the Gazette of India.

All Owners, Agents and Managers of metalliferous mines are advised to ensure strict compliance with this circular.

27.6.16
(Rahul Guha)
Director General of Mines Safety

सत्यमेव जयते
भारत सरकार / Govt. of India
श्रम एवं रोजगार मंत्रालय
Ministry of Labour and Employment
खान सुरक्षा महानिदेशालय
Directorate General of Mines Safety

DGMS(S&T)(Tech.) Circular No. 12 **Dhanbad, Dated 20/07/ 2016**

To

All Owners, Agents and Mangers of Coal Mines

Subject: **Treatment of coal dust with incombustible dust in the workings of belowground coal mines and sampling thereof.**

Sir,

Detailed provisions pertaining to treatment of coal dust in the workings of belowground coal mines with fine incombustible dust and sampling of the mine dust have been made under regulations 123A and 123B respectively of the Coal Mines Regulations, 1957. However, based on the feedback received from various sources, it has come to the notice of this Directorate that the ground reality of treatment of the coal dust and sampling of dust in mine workings is not up to the mark. In most of the mines, the supply of incombustible (stone) dust is not only far less than the actual requirement, but the same is also irregular, resulting in absence of a system of regular treatment and sampling of the dust.

Needless to say, regular sampling and adequate treatment of the dust in belowground coal mines is of paramount importance as the same have got direct bearing on mitigation of explosion hazard. Recently, in a meeting of experts from ISM, CIMFR, CMPDIL and DGMS held on 04.07.2016 at DGMS Dhanbad, serious concerns have been raised on the poor status of compliance of the above provisions in Indian coal mines.

The Owners, Agents and Mangers of all belowground coal mines are, therefore, advised to give due importance to the above issue and take special care to ensure regular sampling and treatment of coal dust in the mine workings as stipulated under regulations 123A and 123B of the Coal Mines Regulations, 1957.

20.7.16
(Rahul Guha)
Director General of Mines Safety

भारत सरकार/Government of India
श्रम एवं रोजगार मंत्रालय/Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय/Directorate General of Mines Safety

No. DGMS (Tech) Circular (OH)/01 Dhanbad , dated 28.04. 2022

To,
The Owner, Agent and Manager of all Mines

Subject: **Accident/ incidences due to exposure to high atmospheric temperature.**

Sir,

Due to rising of the atmospheric temperature, mine workers can be subjected to high levels of heat and humidity that may cause heat related morbidity and mortality. This year we are experiencing unprecedented heat waves across India including mining belt.

DGMS has already issued the consequences due to high atmospheric temperature and precautionary measures vide DGMS Circular No. DGMS (Tech) Circular (MAMID)/01, dated 06.05.2015.The same is annexed for your perusal and compliance.

Yours faithfully,

28.04.2022
(Prabhat Kumar)
Director General of Mines Safety

Encl:- As above

भारत सरकार
Government of India
श्रम एवं रोजगार मंत्रालय
Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय
Directorate General of Mines Safety

No. DGMS (Tech) Circular (MAMID)/ 01 Dhanbad, dated : 06 / 05 /2015

To

The Owner, Agent and Manager of all Mines

Subject : Accidents/incidences due to exposure to high atmospheric temperature.

Sir,

During peak summer every year, many incidences of mine-workers getting exposed to high atmospheric temperature get reported. Some such cases had turned into fatalities. Opencast mines during summer are most vulnerable in this regard. In some cases, persons got affected due to heat in underground mines also, where ventilation was inadequate. Inquiries revealed that in most of the cases "Heat Stroke" was the major contributory cause. Heat stroke generally occurs when the body stops adjusting to the hot temperature by sweating, and can't keep up with the heat. It is characterized by hot, dry, red skin that is warm or hot to touch and immediate medical attention is needed in such cases. The other heat related disorders could be,

Heat Exhaustion
Heat exhaustion is caused by loss of large amounts of fluid from the body. A worker with heat exhaustion continues to sweat, but their body can't keep up with the heat. The worker may have a headache, fatigue, or flu like symptoms. In most cases the worker needs to rest, cool down, and drink plenty of fluid.

Heat Cramps
Workers may suffer from cramps and painful muscle spasms. This happens when workers drink water to replace the fluids they lose from sweating, but don't replace the body's loss of salt. Drinking fluids with electrolyte replacement ingredients are recommended in such cases.

Heat Syncope
Heat syncope is a fainting episode or dizziness that usually occurs with prolonged standing or sudden rising from a sitting or lying position. Factors that may contribute to heat syncope include dehydration and lack of acclimatization.

Heat Rash
Heat rash is a skin irritation caused by excessive sweating during hot, humid weather.

Neurological Effects
Excessive heat may also lower mental alertness and ability to work. Workers in extreme environments may make more mistakes and may have more injuries.

Contributing Causes
Heat can increase the risk of suffering from other illnesses and health problems.

The following precautions will go a long way in overcoming such incidences/accidents,

1. Slowing down the pace of work should be allowed, especially if the worker feels even slight heat strain,
2. Rest areas should be located as near to the workplace as practicable,
3. Ensure that adequate quantity of cool water and electrolyte supplements are easily available,
4. In really hot conditions, workers should drink at least a glass of water every 15-20 minutes,
5. Different schedules may be negotiated to let workers do the hardest work during the coolest parts of the day,
6. Rest timings may be re-scheduled to avoid work during high/extremely hot temperatures. Where this is not possible, a two-person crew should be assigned to perform work during extremely hot temperatures,
7. Ensure that worker do not enter/work in an atmosphere having no ventilation or inadequate ventilation in underground mines,
8. Workers must be made aware of the dangers from excessive heat and humidity and remedial measures.

Yours faithfully,

(Rahul Guha) 6.5.15
Director General of Mines Safety

सत्यमेव जयते
आज़ादी का अमृत महोत्सव
भारत सरकार
Government of India
श्रम एंव रोजगार मंत्रालय
Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय
Directorate General of Mines Safety

DGMS(Genl)/ Circular No. 01 of 2023

Dhanbad, Dated 10th May 2023

To

All Owner, Agent and Manager of the Mines.

Sub: Jurisdiction of the Zones and Regions of DGMS after Reorganisation - Reg.

Please refer to the Notification of Government of India, Ministry of Labour and Employment, (Directorate General of Mines Safety), published in the Gazette of India, part II, Section – 3, Sub-Section (i), vide G.S.R. 300(E) dated the 17th April 2023 read with corrigendum published vide G.S.R. 342(E) dated the 2nd May 2023 in respect of the Jurisdiction of Zones and Regions of the Directorate General of Mines Safety. Subsequent to the reorganization of jurisdiction of zonal and regional offices of DGMS, revised jurisdiction of zones and regions is as below:

Central Zone (CZ) having jurisdiction in the State of Bihar and part of Jharkhand with Headquarters (HQ) at Dhanbad (Jharkhand), comprising of Dhanbad Region-1, Dhanbad Region-2, Dhanbad Region-3 and Koderma Region.

Dhanbad Region-1, Head Quarters at Dhanbad in the State of Jharkhand

Part of the Jharkhand state : All the mines in the district of Dhanbad lying on the West of Giridih-Tundi- Govindpur Road and North of NH- 32 from Govindpur - Dhanbad to Bokaro.

Dhanbad Region-2, Head Quarters at Dhanbad in the State of Jharkhand

Part of the Jharkhand state : All the mines in the district of Dhanbad lying on the East of Giridih-Tundi-Govindpur Road and South of NH-32 from Govindpur- Dhanbad to Bokaro.

Dhanbad Region-3, Head Quarters at Dhanbad in the State of Jharkhand

Part of the Jharkhand state : All the mines in the districts of Jamtara, Deoghar, Dumka, Pakur, Godda and Sahebganj.

Koderma Region, Head Quarters at Koderma in the State of Jharkhand

Bihar state & Part of Jharkhand : All the mines of Bihar state and all mines in the districts of Koderma, Giridih & Bokaro of Jharkhand state.

Eastern Zone (EZ) having jurisdiction in the States of West Bengal, Assam, Sikkim, Arunachal Pradesh, Manipur, Mizoram, Meghalaya, Nagaland, Tripura and Union Territory (UT) of Andaman & Nicobar Islands with Headquarters at Sitarampur (West Bengal), comprising of Sitarampur Region-1, Sitarampur Region-2, Sitarampur Region-3 and Guwahati Region.

Sitarampur Region-1, Head Quarters at Sitarampur in the State of West Bengal

Part of West Bengal state : All the mines in the District of Paschim (West) Burdwan situated on the south of NH-2.
All mines in the districts of Purulia, Bankura, Jhargram, Paschim (west) Medinipur and Purba (East) Medinipur.

Sitarampur Region-2, Head Quarters at Sitarampur in the State of West Bengal

Part of West Bengal state : All the mines in the districts of Paschim (west) Burdwan in the north of NH-2 and east of NH-60 leading from Punjabi more on NH-2 to

Pandaveswar Ghat.
All Mines in the districts of Purba(East) Burdwan, Murshidabad, Nadia, North-24-Parganas, South-24-Parganas, Howrah, Hooghly, Kolkata, Malda, Dakshin Dinajpur, Uttar Dinajpur, Darjeeling, Jalpaiguri, Alipurdwar, Cooch Behar and Kalimpong.

UT of Andaman & Nicobar Islands : All Mines

Sitarampur Region-3, Head Quarters at Sitarampur in the State of West Bengal

Part of West Bengal state : All the mines in the districts of Paschim (West) Burdwan on the north of NH-2 and west of NH-60 leading from Punjabi more on NH-2 to Pandaveswar Ghat.
All the mines in the district of Birbhum

Guwahati Region, Head Quarters at Guwahati in the State of Assam

States of Assam, Sikkim, Arunachal Pradesh, Manipur, Mizoram, Meghalaya, Nagaland and Tripura : All Mines.

South Eastern Zone (SEZ) having jurisdiction in the State of Odisha and Part of Jharkhand with Headquarters at Ranchi (Jharkhand), comprising of Ranchi Region, Chaibasa Region, Bhubaneswar Region-1 and Bhubaneswar Region-2.

Ranchi Region, Head Quarters at Ranchi in the State of Jharkhand

Part of the Jharkhand state : All mines in the districts of Ranchi, Ramgarh, Hazaribagh, Chatra, Palamu and Garhwa.

Chaibasa Region, Head Quarters at Chaibasa in the State of Jharkhand

Part of the Jharkhand state : All Mines in the districts of East- Singhbhum, West-Singhbhum, Saraikela-Kharsawan, Gumla, Khunti, Simdega, Latehar and Lohardaga

Bhubaneswar Region-1, Head Quarters at Bhubaneswar in the State of Odisha

Part of Odisha state : All Mines in the districts of Angul, Dhenkanal, Jajpur, Keonjhar (Kendujhar), Bhadrak, Balasore(Baleswar), Kendrapara, Jagatsinghapur, Cuttak, Khordha, Puri, Nayagarh, Ganjam, Gajapati and Mayurbhanj.

Bhubaneswar Region-2, Head Quarters at Bhubaneswar in the State of Odisha

Part of Odisha state : All Mines in the districts of Sundargarh, Jharsuguda, Sambalpur, Deogarh (Debagarh), Boudh, Bargarh, Subarnapur (Sonepur), Nuapada, Balangir, Kandhamal (Phulbani), Rayagada, Kalahandi, Nabarangpur, Koraput and Malkangiri.

South Central Zone (SCZ) having jurisdiction in the States of Telangana and Andhra Pradesh with Headquarters at Hyderabad (Telangana), comprising of Hyderabad Region-1, Hyderabad Region-2, Hyderabad Region-3 and Nellore Region.

Hyderabad Region-1, Head Quarters at Hyderabad in the State of Telangana

Part of Telangana state : All Mines in the districts of Khammam, Karimnagar, Hanumakonda, Warangal, Mahabubabad, Bhadradri Kothagudem, Jayashankar Bhupalpally, Mulugu, Jangoan, Siddipet, Mahabubnagar, Wanaparthy, Jogulamba Gadwal, Narayanpet, Suryapet, Yadadri Bhuvanagiri, Medchal-Malkajgiri, Rangareddy, Hyderabad, Nalgonda and Nagarkurnool.

Hyderabad Region-2, Head Quarters at Hyderabad in the State of Telangana

Part of the Telangana state : All Mines in the districts of Adilabad, Mancherial, Nirmal, Komuram Bheem, Nizamabad, Peddapalli, Rajanna-Sircilla, Kamareddy, Medak, Sangareddy, Jagtial and Vikarabad.

Hyderabad Region-3, Head Quarters at Hyderabad in the State of Telangana

Part of the Andhra Pradesh state	:	All Mines in the districts of West Godavari, East Godavari, Krishna, Kakinada, Dr B.R.Ambedkar Konaseema, Eluru, Alluri Sitharamaraju, Guntur, Palnadu, Bapatla, Visakhapatnam, Vizianagaram, Srikakulam, Prakasam, Kurnool, Nandyal, Anakapalli, Parvathipuram-Manyam and NTR.

Nellore Region, Head Quarters at Nellore in the State of Andhra Pradesh

Part of the Andhra Pradesh state	:	All mines in the districts of Sri Potti Sreeramulu Nellore, YSR, Chittoor, Ananthapuramu, Annamayya, Tirupati, and Sri Satyasai.

Southern Zone (SZ) having jurisdiction in the States of Karnataka, Kerala, Tamil Nadu and Union Territories (UTs) of Lakshadweep Islands & Puducherry with Headquarters at Bengaluru (Karnataka), comprising of Bengaluru Region, Bellary Region-1, Bellary Region-2 and Chennai Region.

Bengaluru Region, Head Quarters at Bengaluru in the State of Karnataka

Part of the Karnataka state	:	All mines in the districts of Chikmagalur, Dakshin Kannada, Chitradurga, Tumkur, Hassan, Kolar, Bengaluru Urban, Bengaluru Rural, Mandya, Mysuru (Mysore), Chamarajnagar, Kodagu, Ramanagara, Chikkaballapura, Davangere, Shivamogga and Udupi.
Kerala and UT of Lakshadweep Islands	:	All Mines

Bellary Region-1, Head Quarters at Bellary in the State of Karnataka

Part of Karnataka state	:	All Mines in the districts of Ballary(Bellary),Vijayanagara, Raichur(Raichuru), Yadgiri, Kalaburgi (Gulbarga) and Bidar

Bellary Region-2, Head Quarters at Bellary in the State of Karnataka

Part of the Karnataka state	:	All mines in the districts of Vijayapura(Bijapur), Bagalkote, Gadag, Koppal, Belagavi(Belgaum), Dharwad, Haveri and Uttar Kannada.

Chennai Region, Head Quarters at Chennai in the State of Tamil Nadu

Tamil Nadu state	:	All mines
UT of Puducherry	:	All Mines.

Western Zone (WZ) having jurisdiction in the States of Maharashtra, Chhattisgarh and Goa with Headquarter at Nagpur (Maharashtra), comprising of Nagpur Region-1, Nagpur Region-2, Bilaspur Region-1, Bilaspur Region-2, Raigarh Region and Goa Region.

Nagpur Region-1, Head Quarters at Nagpur in the State of Maharashtra

Part of Maharashtra state	:	All mines in the districts of Gondia, Bhandara, Nagpur, Wardha, Amravati, Akola, Buldhana, Jalna, Hingoli, Parbhani, Aurangabad, Washim and Gadchiroli.

Nagpur Region-2, Head Quarters at Nagpur in the State of Maharashtra

Part of Maharashtra state	:	All mines in the districts of Chandrapur, Yavatmal, Nanded, Latur, Beed and Osmanabad.

Bilaspur Region-1, Head Quarters at Bilaspur in the State of Chhattisgarh

Part of Chhattisgarh state	:	All Mines in the districts of Korba, Raipur, Gariaband, Balodabazar-Bhatapara, Dhamtari, Bastar, Kondagaon and Sukma.

Bilaspur Region-2, Head Quarters at Bilaspur in the State of Chhattisgarh

Part of Chhattisgarh state	:	All Mines in the districts of Korea, Manendragarh-Chirmiri- Bharatpur, Bilaspur, Mungeli, Kawardha(Kabirdham), Durg, Rajnandgaon,

Khairagarh-Chhuikhadan-Gandai, Mohla-Manpur-Ambagarh Chouki, Balod, Bemetara, Kanker, Narayanpur, Dantewada, Bijapur and Gaurela-Pendra-Marwahi.

Raigarh Region, Head Quarters at Raigarh in the State of Chhattisgarh

Part of Chhattisgarh state : All Mines in the districts of Raigarh, Sarangarh-Bilaigarh, Jashpur, Surguja, Surajpur, Balrampur, Janjgir- Champa, Sakti and Mahasamund.

Goa Region, Head Quarters at Madgaon in the State of Goa

Goa state : All Mines in the state of Goa.

Part of Maharashtra state : All Mines in the districts of Ahmednagar, Nandurbar, Mumbai, Mumbai Suburban, Thane, Palghar, Nashik, Dhule, Jalgaon, Satara, Ratnagiri, Sangli, Kolhapur, Solapur, Sindhudurg, Raigad and Pune.

North Western Zone (NWZ) having jurisdiction in the States of Gujarat, Rajasthan and Union Territories (UTs) of Daman, Dadra & Nagar Haveli and Diu, with Headquarters at Udaipur (Rajasthan), comprising of Ahmedabad Region-1, Ahmedabad Region-2, Surat Region, Udaipur region, Ajmer Region-1 and Ajmer Region-2.

Ahmedabad Region-1, Head Quarters at Ahmedabad in the State of Gujarat

Part of Gujarat state : All Mines in the districts of Jamnagar, Devbhoomi Dwarka, Porbandar, Rajkot, Morbi, Junagadh, Gir-Somnath, Amreli, Bhavnagar, Ahmedabad and Botad.

UT of Diu : All Mines

Ahmedabad Region-2, Head Quarters at Ahmedabad in the State of Gujarat

Part of Gujarat state : All Mines in the districts of Gandhinagar, Mehasana, Patan, Kutch, Mahisagar, Surendra Nagar, Banaskantha, Sabarkantha and Aravalli.

Surat Region, Head Quarters at Surat in the State of Gujarat

Part of Gujarat state : All Mines in the districts of Panchmahal, Dahod, Vadodara, Chhota Udaipur, Bharuch, Narmada, Surat, Navsari, Tapi, Valsad, Dang, Anand and kheda.

UT of Daman, Dadra & Nagar Haveli : All Mines in Daman and Dadra & Nagar Haveli

Udaipur Region, Head Quarter at Udaipur in the State of Rajasthan

Part of the Rajasthan state : All mines in the district of Rajsamand, Udaipur, Dungarpur, Banswara, Pratapgarh, Chittorgarh, Sirohi and Jalore

Ajmer Region-1, Head Quarter at Ajmer in the State of Rajasthan

Part of the Rajasthan state : All mines in the district of Jaipur, Ajmer, Dausa, SawaiMadhopur, Tonk, Bundi, Bharatpur, Alwar, Kota, Bhilwara, Baran, Jhalawar, Karauli and Dholpur.

Ajmer Region-2, Head Quarters at Ajmer in the State of Rajasthan

Part of the Rajasthan state : All mines in the district of Jodhpur, Barmer, Jaisalmer, Bikaner , Sri Ganganagar, Hanumangarh , Pali, Nagaur, Churu, , Jhunjhunu and Sikar

Northern Zone (NZ) having jurisdiction in the States of Uttar Pradesh, Haryana, Uttarakhand, Himachal Pradesh, Punjab, Madhya Pradesh and Union Territories (UTs) of Delhi, Chandigarh, Jammu & Kashmir and Laddakh with Headquarters at Ghaziabad (Uttar Pradesh), comprising of Ghaziabad Region, Srinagar Region, Parasia Region, Jabalpur Region, Gwalior Region and Varanasi Region.

Ghaziabad Region, Head Quarters at Ghaziabad in the State of Uttar Pradesh

Part of Uttar Pradesh state : All Mines in the districts of Muzaffarnagar, Shamli, Saharanpur, Bijnor, Meerut, Hapur, Baghpat, Ghaziabad, Bulandshahar, Gautam Buddha Nagar, Jyotiba Phule Nagar(Amroha), Moradabad, Rampur, Aligarh, Badaun, Sambhal(BhimNagar), Bareilly, Pilibhit, Mathura, Hathras, Etah, Kanshiram Nagar (Kasganj), Shahjahanpur, Lakhimpur Kheri, Agra, Firozabad, Mainpuri, Farrukhabad, Hardoi, Sitapur, Etawah, Kannauj, Auraiya, Kanpur Nagar, Kanpur Dehat, Unnao, Lucknow, Jalaun, Jhansi, Lalitpur , Hamirpur and Mahoba.

Haryana, Uttarakhand states and UT of Delhi : All mines

Srinagar Region, Head Quarters at Srinagar in the Union Territory of Jammu and Kashmir

UTs of Jammu & Kashmir, Laddakh and Chandigarh : All mines

Himachal Pradesh and Punjab states : All mines

Parasia Region, Head Quarters at Parasia in the State of Madhya Pradesh

Part of Madhya Pradesh state : All Mines in the districts of Chhindwara, Betul, Seoni, Balaghat, Mandla, Narmadapuram (Hoshangabad), Narsinghpur and Harda.

Jabalpur Region, Head Quarters at Jabalpur in the State of Madhya Pradesh

Part of Madhya Pradesh state : All Mines in the districts of Rewa, Satna, Panna, Damoh, Katni, Umaria, Shahdol, Anuppur, Jabalpur and Raisen.

Gwalior Region, Head Quarters at Gwalior in the State of Madhya Pradesh

Part of Madhya Pradesh state : All Mines in the districts of Morena, Sheopur, Bhind, Gwalior, Shivpuri, Guna, Bhopal, Vidisha, Datia, Rajgarh, Tikamgarh, Chhatarpur, Ashok Nagar, Sagar, Sehore, Jhabua, Alirajpur, Dhar, Khargone, Khandwa, Barwani, Burhanpur, Neemuch, Mandsaur, Ratlam, Ujjain, Shajapur, Agar Malwa, Dewas, Indore, Niwari and Dindori.

Varanasi Region, Head Quarters at Varanasi in the State of Uttara Pradesh

Part of Uttar Pradesh state : All mines in the districts of Bahraich, Shravasti, Barabanki, Gonda, Raebareli, Fatehpur, Banda, Chitrakoot, Kaushambi, Pratapgarh, Sultanpur, Amethi, Ayodhya (Faizabad), Basti, Balarampur, Siddharth Nagar, Maharajganj, Sant Kabir Nagar, Ambedkar Nagar, Jaunpur, Prayagraj, Kushinagar, Deoria, Gorakhpur, Azamgarh, Mau, Ballia, Sant Ravidas Nagar (Bhadohi), Varanasi, Mirzapur, Chandauli, Sonbhadra and Ghazipur.

Part of Madhya Pradesh state : All mines in the district Sidhi and Singrouli (Waidhan).

This is in supersession of the earlier circulars issued in this regard.

10/05/2023

(Prabhat Kumar)
Director General of Mines Safety &
Chief Inspector of Mines.

सत्यमेव जयते
भारत सरकार/Government of India
श्रम एंव रोजगार मंत्रालय/Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय/Directorate General of Mines Safety

DGMS (Tech) Circular No. 10 of 2020 Dhanbad, dated: 23 / 06/2020

To,
Owners/Agents/Managers of all mines

Subject: Protection against lightning in mines-Reg.

1.0 Of late, it is observed that there have been spurts in incidents related to lightning in the mines as a number of persons and installations got hit by the lightning in direct or indirect manner, endangering their safety in the process. Following measures are suggested herewith to be followed in mines as to prevent occurrence of incidents related to lightning:

2.0 In case of every mine, the Lightning risk assessment study shall be carried out with an emphasis to calculate Expected number of lightning flashes per square kilometre per year as elaborated in IS-2309 or IS/IEC-62305. It is instructed that the mine shall mandatorily be equipped with adequate lightning protection in the event of measure of **Exposure risk** i.e. **Expected number of lightning flashes per square kilometre per year** coming in excess of $\mathbf{10^{-5}}$ (1 in 100,000).

3.0 Even if the calculation of **Exposure risk** is in moderation of $\mathbf{10^{-5}}$ (1 in 100,000), the adequate lightning protection shall be provided in the following areas of mine in the interest of safety:

a) Where large numbers of people congregate;
b) Where the blasting operations are carried out.
c) Where the explosives are stored;
d) Where the overhead lines passing through the mine periphery;
e) Where the pumping installations are there which necessitate the continuous presence of an operator or maintenance crew at the site;
f) At the top of OB dump yard, which are more vulnerable and liable to attract lightning with likelihood of injuring the persons employed there.

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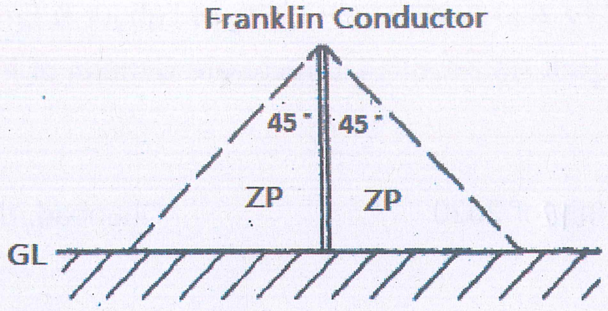
4.0 Depending upon the type of application, following lightning protection systems (LPS) shall be provided as a safeguard against lightning:

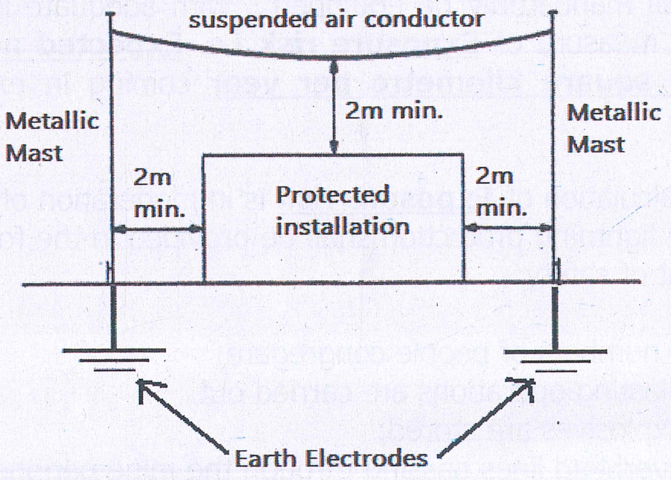
4.1 **Conventional air terminal (Franklin Rod/conductor):** This shall be provided in the manner that the site to be protected shall be within **45°** of Zone of Protection (i.e. ZP) in the manner as depicted below:


Franklin Conductor
45°
45°
ZP
ZP
GL

4.1.1 The ZP shall be further reduced to **30°** for important places, where dangers associated with lightning are more or which require fool-proof lightning protections.

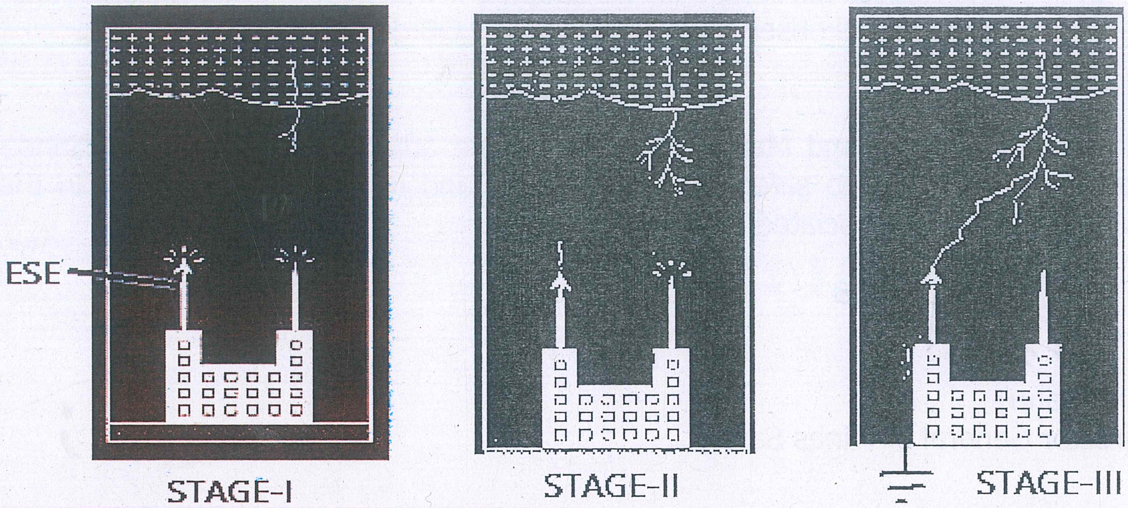
4.1.2 The Franklin or lightning conductor shall be so installed as to cover the places like blasting site, places of people congregation, etc in respective Zone of Protection (ZP).

4.2 **MESHED CONDUCTOR NETWORK or Faraday's Cage:** By providing Electrostatic shielding using metallic wires in criss-crossed manner and grounding the same minimum at two independent places in the manner as shown below. The installations to be protected include outdoor of a sub-station i.e. switchyard, explosive room, etc.


suspended air conductor
Metallic Mast
2m min.
Metallic Mast
2m min.
Protected installation
2m min.
Earth Electrodes

23/06/2020

4.3 **IONIZING AIR TERMINAL or EARLY STREAMER EMISSION (ESE):** ESE system functions by generating an upward ladder through the respective air terminal as to meet the downward leader progressing downward from the cloud at a certain speed as to preferentially strike the lightning to the relevant point as demonstrated below:



STAGE-I STAGE-II STAGE-III

4.3.1 The design and specifications of ESE system to be installed shall be in accordance with the relevant Indian/international standard and should be tested in an NABL or internationally recognized laboratory as a prerequisite prior to its use.

4.4 The provisions as mentioned in IEC 62305-3 shall be followed with regard to protection of various installations of oil mines against lightning.

4.5 The records related to lightning survey and maintenance shall be properly maintained.

4.6 This circular is not exhaustive and provisions of relevant standards shall be followed depending upon the merit of the case.

5.0 All the remedial measures as elaborated above won't deliver the desired outcome if the lightning pulse so collected is not discharged safely to earth through efficient type of grounding system. Following points with regard to earthing systems being used in conjunction with LPS shall be followed scrupulously:

5.1 The earthing system used in conjunction with LPS shall be in accordance with IS-3043 and be designed in such a manner as to prevent the risks of conduction, Induction and Feedback while discharging the lightning strike to earth.

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5.2 The earthing system being used with lightning protection system (LPS) shall be independent from existing grounding system.

5.3 The magnitude of earth pit resistance (collective) shall be within 2Ω or as mentioned in relevant standards as to keep the hazards associated with step and touch potentials within safe limits.

5.4 The remote earthing shall be adopted if the local grounding conditions are not favorable as observed in locations like OB dump yard, quarry, etc.

All Owners, Agents and Managers of mines are advised to ensure compliance of the above guidelines as to safeguard the persons and machineries deployed in the mines from the hazards associated with lightning strike.

23/06/2020

(D K Sahu)
Director General of Mines Safety

भारत सरकार / Government of India
श्रम एवं रोजगार मंत्रालय / Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय/Directorate General of Mines Safety

DGMS(Tech.) Circular No. 03 of 2020 **Dhanbad, dated 16|01|2020**

To

All Owners, Agents and Managers of Opencast Coal Mines.

Subject: Guidelines for Scientific Study under Regulation 106 of Coal Mines Regulations, 2017

Sir,

Regulation 106(2) of the Coal Mines Regulations, 2017 (CMR, 2017) mandates that before starting a mechanized opencast working, the owner and agent of the mine have to ensure that the mine, including its method of working, ultimate pit slope, dump slope and monitoring of slope stability, has been planned, designed and worked as determined by a scientific study and a copy of the report of such study has been kept available in the office of the mine. Further, Regulation 106(3) of the same requires the owner, agent and manager of every such mechanized opencast mines to ensure that the recommendations made in the report of scientific study referred to in sub-regulation (2) are complied with.

However, recent scrutiny by officers of this Directorate, of reports of scientific study undertaken in different mines to meet the above statutory requirements revealed several serious discrepancies like unconnected subjectivity, inconclusiveness, factual mistakes, etc. Invariably, recommendations made on any particular activity were completely devoid of logic. In nut shell, such reports appeared to have been made without any scientific basis and justification, thereby defeating the very essence of the statute to enbling the mine level management with scientific backing in respect of planning and execution of mining activities.

Therefore, with a view to reviewing the prevailing status and standardizing the basic elements of a scientific study as referred above, a technical workshop on the subject captioned "scientific study and slope monitoring in opencast mines and way forward" was organized by DGMS on 06.12.2019 at DGMS Western Zone, Nagpur. The workshop was attended by about 79 officials and experts from regulator, various coal mining companies and research/academic institutions, like DGMS, CMPDI, CSIR-CIMFR, IIT Kharagpur, VNIT Nagpur, M/s SECL, M/s MCL, M/s NCL, M/s WCL, M/s ECL, M/s SCCL, M/s NLC, M/s SAIL, etc.

After detail deliberations and discussions, the following considerations emerged in respect of any scientific study to be made under Regulation 106(2) of the CMR - 2017.

1.0 General:

1.1 No part of the report shall contradict with any provision made under the Mines Act, 1952, rules, regulations, byelaws or orders made there under.

2.0 Scope of the study:

2.1 The scope of the said scientific studies conducted in a mine shall address on systematic and scientific mining for the planned life of the mine, and shall include clear recommendation on

i) suitable method of mining for new mine, or review and validation of existing method of mining and with/without modifications,

ii) sequence of mining and sequence of dumping, specially with reference to various geological disturbances traversing the mine, operational slope, ultimate slope,

iii) mechanization including the type/size/capacity, etc., in accordance with the designed capacity of mine,

iv) design of bench geometry including inter-ramps (height, width, slope, etc.), considering blasting/cutting/mechanization, etc., including conditions of deployment of large specialized machinery like draglines, bucket-wheel-excavators, surface miners, etc.,

v) type of drilling and blasting methods including controlled blasting, if so warranted,

vi) transport layout including the haul road dimensions, provision of one-way traffic, separate road for different type/capacity of dumpers/vehicles, layout of other modes of transport like conveyor, etc.,

vii) layouts of various surface facilitations,

viii) slope monitoring as an integral part of planning,

ix) water management viz-a-viz in-pit sump design, de-silting of sumps, design of effective drainage system, requirement of pumping, pre-mining hydrostatic depressurization of bench slope, provision of weep holes, monitoring of profile of water table, hydrological study, etc.,

x) type of dump – external or internal, site selection, dump foundation design to bear the ultimate load of the dump, height, slope, benching/terracing, limiting gradient of base floor for internal dumping, distance from the active workings/quarry edge, other facilities, drainage system, reclamation, etc., and

xi) effect of fire or spontaneous heating on bench/dump stability,

2.2 Care shall also have to be taken to ensuring validation of the pre-existing data by laboratory test, if used for designing the slope, and to ascertain that the data considered for designing/study, is truly site-specific and representative of the mine under study.

3.0 Factor of safety:

3.1 Factor of safety for design of pit bench & dump shall be determined considering all concerned parameters such as geo-mechanical properties of rock-mass, ground water condition, hydro-geological studies, seismic effect, method of mining, etc.

3.2 However, the Minimum Factor of Safety to be considered for design of pit, bench & dump slope shall in any case not be less than 1.50 for permanent or long-standing slopes and 1.30 for all other cases.

4.0 Monitoring scheme for bench and dump slopes:

4.1 The study report shall, among others, categorically specify/recommend

i) a specific methodology of slope monitoring suitable to address the potential level of danger prevailing in the mine,

ii) a suitable system of slope monitoring customized to the local needs, detailing type of instrumentation, frequency, pattern of data collection and analysis and organization for monitoring and

iii) different customized trigger points of observed values, like Warning Level, Withdrawal Level, etc., that may be included in trigger action response plan (TARP).

5.0 In addition to the above, the study report may contain any other aspect concerning planning, design and monitoring in the mine which may be warranted in view of the prevailing local conditions as well as features expected to be encountered in future.

6.0 **The Owner and Agent shall ensure that an appropriate scheme for mining and slope monitoring for the mine(s) under their control on the basis of the scientific study inputs/ report is prepared and a copy thereof is kept maintained at the mine office. The workings and operations of the mine shall strictly adhere to the mining scheme so prepared.**

7.0 The scientific study and the scheme as mentioned above in para 6.0 shall be reviewed time to time or whenever there is any significant change in the mine.

8.0 Notwithstanding the above, before reaching the final stage of mining as designed, the ultimate pit slope shall be again assessed by a fresh scientific study conducted based on experience gained, additionally required inputs, geological disturbances encountered, etc., till then.

Accordingly, all Owners, Agents and Managers of all opencast coal mines are advised to follow the above guidelines for the purpose of preparing the report under Regulation 106(2) of CMR - 2017 based on Scientific Study and implementing the same.

16/1/2020

(R. Subramanian)
Chief Inspector of Mines and
Director General of Mines Safety.

भारत सरकार / Govt. of India
श्रम एवं रोजगार मंत्रालय
Ministry of Labour and Employment
खान सुरक्षा महानिदेशालय
Directorate General of Mines Safety

No. DGMS(S&T)/ (Approval) Circular No. 01 of 2017 /Dhanbad, Dated 10 / 03 /2017

To
The Owner, Agent and Manager of all Coal Mines

Subject: Approval of dust suppression/prevention devices fitted in drilling and boring equipment used in coal mines under regulation 123(6)(b)(ii) of Coal Mines Regulations' 1957.

At present, dust suppression/prevention devices, other than jet of water directed on the cutting edge to wet the cuttings, fitted in drilling and boring equipment for drilling or boring in stone on surface or belowground in coal mines are required to be approved by Chief Inspector of Mines under regulation 123(6)(b)(ii) of Coal Mines Regulations' 1957. A Gazette Notification was also issued in this regard vide GSR 24, published in the Gazette of India Part II Section 3(i) on 8 February 2014.

Based on the above notification, this Directorate has been approving such devices for use in coal mines by issue of special orders on case to case basis. Now, in order to bring further simplification in its approval, it has been decided that the subject matter may be brought under the domain of general approval. In view of this, a meeting was held on 04.7.2016 at DGMS (HQ), Dhanbad, for technical deliberations on the subject, in which experts from CIMFR, ISM, CMPDI and DGMS participated. After detailed deliberations, a draft standard for manufacturing, testing and use of dust suppression/prevention devices fitted in drilling and boring equipment used in coal mines was finalized, which was further discussed in the meetings of approval Committee of DGMS. Based on the above inputs, the standards and parameters for manufacturing, testing and use of such dust suppression/prevention devices are prescribed below:

1.0 General requirements

1.1 The dust suppression/prevention device or any part thereof fitted with drilling and boring equipment used in belowground coal mine shall not be made of alloy and metals likely to give incendive frictional sparks as required under Circular No. DGMS Tech. Circular no. 08 of 1974 or its revised version.

1.2 The flame proof and intrinsically safe features of electrical items of the dust suppression/prevention device to be used in belowground coal mines shall also conform to the standards specified in Circular No. DGMS Tech. Circular (Electrical), (Approval) no. 23 dated, 21.12.2015 or its revised version.

1.3 (a). The device shall be capable of suppressing/preventing the liberation or release of airborne dust while drilling or boring to such extent as to keep the concentration of respirable dust in the mine atmosphere within the permissible limit prescribed under regulation 123(2) of Coal Mines Regulations' 1957 or as amended from time to time.

(b). To ensure compliance of clause 1.3(a), amongst others, the dust survey shall be conducted with approved type of dust samplers as specified in regulation 123(2) of Coal Mines Regulations' 1957 or as amended from time to time. During such survey, the dust concentration shall be measured at the exit point of exhaust air of the dust suppression device, at the nearest point of drilling or boring where persons are required to be present and also at operator's normal working position (nose position), while the drilling or boring machine is in operation. The result of every such survey shall be recorded, signed and dated by the official carrying out the survey and the same shall be countersigned by the Manager.

(c). When result of the dust survey is found in excess of the permissible limit of dust concentration as stipulated under clause 1.3(a), the normal operation of the drilling or boring equipment shall be ceased and it shall not be resumed until the defect therein has been rectified and the requirements of Para 1.3(a) above has been found complied by conducting a dust survey in the manner specified under para 1.3(b) above. Every such incident shall be recorded in a book kept for the purpose and signed and dated by the official carrying out the survey and the same shall be countersigned by the Manager.

(d) Frequency of the dust survey: The dust survey shall be carried out in respect of every such drilling or boring equipment at the time of its first installation and thereafter at an interval of not exceeding one month as specified in clause 1.3.(b).

2.0 Testing of the dust suppression/prevention devices

Prototype Tests: At least one proto type sample of the device shall be subjected to tests by a test house prescribed under the para 6.0 of Approval policy, 2015(II Revision) of DGMS or its revised version, subject to the compliance of clause 1.3(a) of this general approval.

3.0 Marking

The following details shall be conspicuously marked on the body of the dust suppression / prevention device:

- Name of the manufacturer or registered trade mark;
- Date of its manufacturing and model;
- Additional marking required by the applicable industrial safety standards.

4.0 Manufacturer's Responsibilities

4.1 The manufacturer shall -

i. furnish all the relevant information in respect of specifications and certified copy of test reports or any other information pertinent to their product(s) to the user(s), along with each consignment;

ii. supply the certified drawing and specifications of the dust suppression/prevention device, which shall not be at variance with the prototype sample as mentioned in Para 2.0, to the user(s); and

iii. arrange to provide an instruction manual on the storage, maintenance, handling, installation and use of the dust suppression/prevention device to the user(s) along with each consignment.

4.2 The manufacturer shall supply to the user a copy of such valid certificates and test report(s) mentioned in the aforesaid Paras and also a compliance report against conditions mentioned in para No. 1.1 and 1.2 to facilitate use of the dust suppression/prevention devices with drilling or boring machines in the mine.

5.0 Responsibilities of Owner, Agent and Manager (User)

5.1 Before using the dust suppression/prevention device in drilling or boring machines in the mines, the user shall ensure that the device conforms to the above mentioned standards.

5.2 The user shall ensure that the manufacturer possesses adequate facilities for manufacturing and testing of the dust suppression/prevention devices.

5.3 The users shall obtain copies of all valid certificate(s) and test report(s) from the manufacturer while purchasing and before using the dust suppression/prevention device in drilling or boring machines in the mine.

5.4 The performance tests required under clause (a), (b), (c) and (d) of para 1.3 shall be the responsibility of the user.

5.5 The user shall ensure that the storage, maintenance, handling, installation and use of the dust suppression / prevention device are done as per the Manual / Operating instructions of the device.

6.0 Miscellaneous

6.1 The Chief Inspector of Mines or an Inspector of Mines may inspect, check and examine the manufacturing facilities of the dust suppression/prevention devices at any time and get samples tested during the course of inspection or send such samples for testing at any prescribed test houses/laboratories at the cost of the manufacturer.

6.2 The Chief Inspector of Mines or an Inspector of Mines may inspect, check and examine the dust suppression/prevention devices fitted in drilling or boring machines at any time in the mine and get samples tested during the course of inspection or send such samples for testing at any prescribed test houses/laboratories at the cost of Owner, Agent or Manager of the mine.

6.3 All users and the manufacturers shall be required to comply with this standard and any deviation or defects found in the product supplied or used in the mine, shall be brought to the notice of this Directorate.

6.4 The manufacturers, and the test houses, who are engaged for testing of such dust suppression/prevention devices, and the users shall adhere to the above mentioned standards and parameters while testing, before supplying and using the dust suppression/prevention devices fitted in drilling or boring machines in the mine.

7.0 The dust suppression/prevention devices fitted in drilling and boring equipment, with the standards, parameters and testing as mentioned above in this circular, shall be considered as approved by the Chief Inspector of Mines under regulation 123(6) (b) (ii) of the Coal Mines Regulations, 1957.

The dust suppression/prevention device having valid special approval by DGMS shall also be considered at par with those devices approved under this general approval for use in coal mines.

10/03/17

Chief Inspector of Mines

भारत सरकार / Govt. of India
श्रम एवं रोजगार मंत्रालय
Ministry of Labour and Employment
खान सुरक्षा महानिदेशालय
Directorate General of Mines Safety

No. DGMS(S&T)/ (Approval) Circular No. 02 of 2017 Dhanbad, Dated 10/03/2017

To

The Owner, Agent and Manager of all Metalliferous Mines

Subject: Approval of dust suppression/prevention devices fitted in drilling and boring equipment used in metalliferous mines under regulation 124(6)(b)(ii) of Metalliferous Mines Regulations' 1961.

At present, the dust suppression/prevention devices, other than a jet of water directed on the cutting edge to wet the cuttings, fitted in drilling and boring equipment for drilling or boring on surface or belowground in metalliferous mines are required to be approved by Chief Inspector of Mines under regulation 124(6)(b)(ii) of Metalliferous Mines Regulations' 1961. A Gazette Notification was also issued in this regard vide GSR 25, published in the Gazette of India Part II Section 3(i) on 8 February 2014.

Based on the above notification, this Directorate has been approving such devices for use in metalliferous mines by issue of special orders on case to case basis. Now, in order to bring further simplification in its approval, it has been decided that the subject matter may be brought under the domain of general approval. In view of this, a meeting was held on 04.7.2016 at DGMS (HQ), Dhanbad, for technical deliberations on the subject, in which experts from CIMFR, ISM, CMPDI and DGMS participated. After detailed deliberations, a draft standard for manufacturing, testing and use of dust suppression/prevention devices fitted in drilling and boring equipment used in metalliferous mines was finalized, which was further discussed in the meetings of approval Committee of DGMS. Based on the above inputs, the standards and parameters for manufacturing, testing and use of such dust suppression/prevention devices are prescribed below:

1.0 General requirements

1.1 (a) The device shall be capable of suppressing/preventing the liberation or release of airborne dust while drilling or boring to such extent as to keep the concentration of respirable dust in the mine atmosphere within the permissible limit prescribed under regulation 124(2) of Metalliferous Mines Regulations' 1961 or as amended from time to time.

(b) To ensure compliance of clause 1.1(a), amongst others, the dust survey shall be conducted with approved type of dust samplers as specified in regulation 124(2) of Metalliferous Mines Regulations' 1961 or as amended from time to time. During such survey, the dust concentration shall be measured at the exit point of exhaust air of the dust suppression device, at the nearest point of drilling or boring where persons are required to be present and also at operator's normal working position (nose position), while the drilling or boring machine is in operation. The result of every such survey shall be recorded, signed and dated by the official carrying out the survey and the same shall be countersigned by the Manager.

(c) When result of the dust survey is found in excess of the permissible limit of dust concentration as stipulated under clause 1.1(a), the normal operation of the drilling or boring equipment shall be ceased and it shall not be resumed until the defect therein has been rectified and the requirements of Para 1.1(a) above has been found complied by conducting a dust survey in the manner specified under para 1.1(b) above. Every such incident shall be recorded in a book kept for the purpose and signed and dated by the official carrying out the survey and the same shall be countersigned by the Manager.

(d) Frequency of the dust survey: The dust survey shall be carried out in respect of every such drilling or boring equipment at the time of its first installation and thereafter at an interval of not exceeding one month as specified in clause 1.1(b).

2.0 Testing of the dust suppression/prevention devices

Prototype Tests: At least one proto type sample of the device shall be subjected to tests by a test house prescribed under para 6.0 of Approval policy, 2015 (II Revision) of DGMS or its revised version, subject to the compliance of clause 1.1(a) of this general approval.

3.0 Marking

The following details shall be conspicuously marked on the body of the dust suppression / prevention device:

- Name of the manufacturer or registered trade mark;
- Date of its manufacturing and model
- Additional marking required by the applicable industrial safety standards.

4.0 Manufacturer's Responsibilities

4.1 The manufacturer shall -

i. furnish all the relevant information in respect of specifications and certified copy of test reports or any other information pertinent to their product(s) to the user(s), along with each consignment;

ii. supply the certified drawing and specifications of the dust suppression/prevention device, which shall not be at variance with the prototype sample as mentioned in Para 2.0, to the user(s); and

iii. arrange to provide an instruction manual on the storage, maintenance, handling, installation and use of the dust suppression/prevention device to the user(s) along with each consignment.

4.2 The manufacturer shall supply to the user a copy of such valid certificates and test report(s) mentioned in the aforesaid Paras to facilitate use of the dust suppression/prevention devices with drilling or boring machines in the mine.

5.0 Responsibilities of Owner, Agent and Manager (User)

5.1 Before using the dust suppression/prevention device in drilling or boring machines in the mines, the user shall ensure that the device conforms to the above mentioned standards.

5.2 The user shall ensure that the manufacturer possesses adequate facilities for manufacturing and testing of the dust suppression/prevention devices.

5.3 The users shall obtain copies of all valid certificate(s) and test report(s) from the manufacturer while purchasing and before using the dust suppression/prevention device in drilling or boring machines in the mine.

5.4 The performance tests required under clause (a), (b), (c) and (d) of para 1.1 shall be the responsibility of the user.

5.5 The user shall ensure that the storage, maintenance, handling, installation and use of the dust suppression / prevention device are done as per the Manual / Operating instructions of the device.

6.0 Miscellaneous

6.1 The Chief Inspector of Mines or an Inspector of Mines may inspect, check and examine the manufacturing facilities of the dust suppression/prevention devices at any time and get samples tested during the course of inspection or send such samples for testing at any prescribed test houses/laboratories at the cost of the manufacturer.

6.2 The Chief Inspector of Mines or an Inspector of Mines may inspect, check and examine the dust suppression/prevention devices fitted in drilling or boring machines at any time in the mine and get samples tested during the course of inspection or send such samples for testing at any prescribed test houses/laboratories at the cost of Owner, Agent or Manager of the mine.

6.3 All users and the manufacturers shall be required to comply with this standard and any deviation or defects found in the product supplied or used in the mine, shall be brought to the notice of this Directorate.

6.4 The manufacturers, and the test houses, who are engaged for testing of such dust suppression/prevention devices, and the users shall adhere to the above mentioned standards and parameters while testing, before supplying and using the dust suppression/prevention devices fitted in drilling or boring machines in the mine.

7.0 The dust suppression/prevention devices fitted in drilling and boring equipment, with the standards, parameters and testing as mentioned above in this circular, shall be considered as approved by the Chief Inspector of Mines under regulation 124(6) (b) (ii) of the Metalliferous Mines Regulations, 1961.

The dust suppression/prevention device having valid special approval by DGMS shall also be considered at par with those devices approved under this general approval for use in metalliferous mines.

10/03/17

Chief Inspector of Mines

o/c
P. [illegible]

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श्रम एवं रोजगार मंत्रालय / Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय/Directorate General of Mines Safety

No. DGMS (Tech) Circular No. 06 of 2020 Dhanbad dated 27.02.2020

To

The Owner/Agent/Manager of Coal and Metalliferous Mines & OEM

Subject: Minimum Design requirements for various Safety Features to be incorporated for use in Heavy Earth Moving Machinery (HEMM) & Heavy/Light vehicles in Open Cast Mines.

1. With increasing dependence on opencast mines for all the production demands in the Coal and Metalliferous sector, there has been a steep rise in the population of HEMMs and heavy/light vehicles in mines, distributed between both departmental and contractual components. The recent statistics on alarming rise in cases of incidences/accidents in opencast mines singularly point to the basic cause as intricately connected to such deployment in mines. Though, several statutory provisions have already been made under the Coal Mines Regulations, 2017 and the Metalliferous Mines Regulations, 1961, and various statutory permissions issued thereunder apart from DGMS Circulars having been issued from time to time, the issue of their safe operations with particular reference to provisioning and satisfactory operation of various safety features, continues to be a major cause of concern to all.

2. Inspections by officers of this Directorate in the recent past have revealed highly unacceptable levels of compliance in mines, with mere provisioning of such safety features gaining the upper hand rather than effective and sustained functionality. Even on provisioning, it has been observed that there are wide variations on design aspects, with availability of multiple but unverified types/models, mostly without adherence to any acceptable Indian/International standards wherever are available already. In nut shell, the very purpose of provisioning and effective functioning of such safety features with HEMMs deployed in opencast mines, appears to be largely defeated as could be appreciated by the alarming rising trends of connected incidences/accidents.

3. Therefore, with a view to harmonizing the entire gamut of safety features to be provided with any HEMM and heavy/light vehicles for deployment in an opencast mine, in respect of the minimum required design/functionality, a one day technical workshop was organized at DGMS(HQ) on the occasion of the 119th Foundation Day Celebrations on the 7th of January, 2020 in which, a total of 260 senior level representatives from coal mines,

metalliferous mines, manufacturers and educational/other institutions respectively, participated, including officers from this Directorate.

4. Arising out of wide, extensive and successful deliberations, a broad consensus was arrived at amongst all stake holders into maintaining the minimum design requirements of such safety features as per the Guidelines enclosed with this Circular. It may please be borne in mind that the enclosed guidelines are only the minimum recommended levels and may be altered from time to time as per evolving needs and that there is no bar on adherence to any higher/superior levels of design and functionality in the interest of safety. It also further be appreciated that adherence to this circular will go a long way in drastically minimizing hazards due to operation of both HEMM and light/heavy vehicles in opencast mines, thus commensurately enhancing safety in mines.

5. Accordingly, the owner/agent/manager of every opencast mine in operation and the Original Equipment Manufacturers (OEM) are requested to ensure compliance with this circular.

26/2/2020

(R. Subramanian)
Director General of Mines Safety (Off.)

Encl: As above.

Enclosure to DGMS (Tech) Circular No. of 2020

GUIDELINES IN RESPECT OF PROVISIONING OF SAFETY FEATURES OF HEMMs & HEAVY/LIGHT VEHICLES FOR SAFE DEPLOYMENT IN OPENCAST MINES.

****

1.0. Rear Vision Camera:

A system that consists of a Monitor (component that provides visual image of Blind Area), Camera (component that transmits the images detected by it to the monitor) and other components capable of detecting objects including people within the Blind area unambiguously with an uninterrupted sequence of signal or information appropriate to detection Zone / Field of View (Blind Area).

Applicability: All Heavy Earth Moving Machinery

1.1. The Rear vision camera shall meet the following minimum requirements and standards:

1.1.1. The system shall boot automatically along with starting of Engine / Power source of Machine, shall perform an initial system check and shall give readiness indication. The system shall shutdown along with shutting down of Engine / Power source. The system shall have system readiness, standby and system malfunction indication to indicate its status.

1.1.2. The system shall remain in stand-by mode (operation mode whereby the system is active, but no information is transmitted by the camera or monitor) and shall wake up automatically upon selection/engagement of appropriate control(s) (such as reverse gear, etc) by Machine Operator for negotiating Blind Area (Killing Zone) to provide uninterrupted vision of Blind Area(s) to the operator. The system shall return to Stand-by mode upon release the appropriate controls by the operator.

1.1.2. The monitor shall be so positioned that it can easily be seen by the Operator sitting in his/her seat in either Day light or Darkness without strain. Appropriate shielding shall be used to reduce the effect of direct sunlight onto the Monitor.

1.1.3. The system shall be provided with auto mode tail light with adequate illumination for better visibility during darkness. The system shall be capable of operating in dark and shall automatically switch to infrared / any other suitable technique /mode when the brightness of field of view is too low or in case of failure of the tail light.

1.1.4. Components of the system shall in no way restrict any function or operation of the machine. The components shall be so designed and mounted to the machine in such a way to limit exposure to, or amplification of, dynamic loads, temperature, shock or vibration and dust that could prematurely damage the device and to deter unauthorized disablement or their removal. Components of system shall be adequately protected from external damage.

1.1.5. The system shall have field of vision in accordance with ISO 16001 (Earth-moving machinery-Object detection systems and visibility aids-Performance requirements and tests) (or equivalent Indian standard when formed), shall satisfy test requirements of ISO 16001 and shall have Ingress Protection of IP 69K in accordance with IEC 60529 (Degrees of Protection Provided by Enclosures (IP Code)) and test Certificates to these effects shall be obtained from any Government / NABL Accredited institutions/Test Houses having adequate test facilities.

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1.1.6. The System may be provided with provisions for recording the images captured with time stamp to enable easy retrieval and analysis of the immediate past 24 deployment operating hours.

2.0. Warning System for Operator Fatigue:

A system capable of analyzing various symptoms associated with Operator fatigue to detect drowsiness of Operator from regular driving / operating behaviour and sound loud audio and visual warnings immediately upon detection of drowsiness to alert the Operator and others in the vicinity by incorporating one or more technique(s).

Applicability: All Heavy Earth Moving Machinery

2.1. The Warning System for Operator Fatigue shall meet the following minimum requirements and standards:

2.2.1. The system shall boot automatically along with starting of Engine / Power source of Machine, shall perform an initial system check and shall give readiness indication. The system shall shutdown along with shutting down of Engine / Power source. The system shall be provided with system "ON", initialization, tracking and system malfunction indication to indicate its status.

2.2. 2.The system shall detect state of drowsiness of Operator from regular driving behavior and shall provide loud verbal warnings to him / her and simultaneously flash externally mounted warning light easily visible to others for alerting the Operator and others in the vicinity to pay attention. It shall also be capable of detecting the drowsiness even when spectacle is worn by the Operator.

2.2.3. The system shall have following four stages:

(a) **Initialization** - Every time the system is started, it needs to be set up and optimized for current user (Operator) and conditions. The initialization process shall be a quick one,
(b) **Tracking** - continuous monitoring of the Operator within a dynamically specified tracking area in real-time,
(c) **Drowsiness Detection** and
(d) **Warning** - Once it has been determined that the driver/operator appears to be in an abnormal driving state, the system shall alert the driver of potential dangers that can arise. Combination of audio and visual alerts is used to attract the Operator's attention and raise their alertness level. Alerting has to be implemented in such a way as not to cause the opposite effect of intended and startle the driver / operator into causing an accident.

2.2.4. Components of the system shall in no way obstruct Operator's line of sight hindering his / her visibility and restrict any function or operation of the machine. The components shall be so designed and mounted to the machine in such a way to limit exposure to, or amplification of, dynamic loads, temperature, shock or vibration and dust that could prematurely damage the device and to deter unauthorized disablement or their removal.

2.2.5. The System may be provided with provisions for recording the warning generated with time stamp to enable easy retrieval and analysis of the immediate past 96 deployment operating hours.

2.2.6. For determining type, duration and sound level of audio warning and intensity of external Visual warning, DGMS Circulars, Indian and International standards issued in this regard may be referred to.

3.0. Auto Dipping System:

Applicability: Dumpers /Tippers / Light and Heavy Vehicles plying in the Mine.

A System comprising sensor(s) and a Control Unit capable of automatically switching high beam lamp to low beam as soon as it senses a vehicle approaching from the opposite direction at a distance of about 150 meters and switches it back to high beam when the vehicles pass each other to avoid glare and blinding of Operator so as to relieve the operator from frequent switching between high and low beam of head light.

3.1. The Auto Dipping System shall meet the following minimum requirements and standards:

3.1.1. The system shall boot automatically along with switching "ON" of head light of the vehicle/machine, shall perform an initial system check and shall give readiness indication. The system shall shutdown along with switching "OFF" of the head light. The system shall be provided with system "ON" and system malfunction indication to indicate its status.

3.1.2. System sensor shall be capable of detecting high beam light of incoming vehicle approaching from opposite direction at a distance of about 150 meters or at much closer proximity in case of vehicles approaching from branch roads and send signal to Control unit. Suitable filters shall be incorporated in the system to avoid nuisance/false reaction to Pole lights, spot lights and haul road general lightings. The sensor shall send appropriate signal immediately to control unit upon cessation of high beam light falling on it.

3.1.3. System control unit shall automatically activate Low beam or high beam upon receipt of appropriate signal from the sensor without the intervention of the Operator.

3.1.4. Components of the system shall in no way obstruct Operator's line of sight hindering his / her visibility. The system shall be equipped with Operator Override to comply with authorized override to meet eventualities.

3.1.5. Test Certificates to these effects shall be obtained from any Government / NABL Accredited institutions/Test Houses having adequate test facilities.

4.0. Mechanical Device to avoid Head to Tail Collision of Dumpers:

A mechanical system / device(s) adequately designed to protect operator of Dumper in the event of Head to Tail collision even in mixed capacity dumpers operating environment. The device(s) / system shall be of standalone mechanical structure or combination of mechanical structures wherein maximum impact energy generated by collision is absorbed by the device / system or diverted away from the operator to protect the operator when the operator is adequately constrained in his / her seat by seat belt.

Applicability: Dumpers

26/2/2020

4.1. The Mechanical Device to avoid Head to Tail Collision of Dumpers shall meet the following minimum requirements and standards:

The system / device(s) shall be of standalone Mechanical structure or combination of Mechanical structures, viz, combination of Operator cabin protective structure and protection arrangement at Tail end of the Dumper or bumper extension or any other suitable arrangements. Hydraulic system or any other suitable system may be included as add-on. As far as possible, in new Dumpers, the Device(s) / System shall be part of original design of the Dumpers to avoid retro fitting difficulties.

4.1.1. The system / device(s) shall protect the Dumper Operator during head to tail collision when the operator is constrained by operator seat belt even in mixed capacity dumper operating environment.

4.1.2. Components of the system / device(s) shall not affect visibility of Operator, stability of the Dumper and intended use for which the Dumper is designed.

4.1.3. The system / device(s) shall absorb most of impact energy generated by collision or divert most of the impact energy away from the Operator so as to ensure protection from direct hit or crushing of Operator.

4.1.4. Components of the system / device(s) shall not hinder with loading operation or foul with components of Loader / Shovel / Excavators.

5.0. Automatic Fire Detection and Suppression System (AFDSS) for HEMM:

An automatic system to detect and suppress fire in hot zones of machine and is capable of sensing, activating and delivering the fire suppression agent(s) without human intervention in the event of fire with additional provision for manual actuation and appropriate indication and warning to Operator by incorporating one or more kinds of heat sensing system and suitable fire suppressant agents.

Applicability: All Heavy Earth Moving Machinery

5.1. The Automatic Fire Detection and Suppression System (AFDSS) shall meet the following minimum requirements and standards:

5.1.1 The system shall meet requirements of DGMS (Approval) Circular No. 2 dated 08.07.2013. In addition, it shall meet following additional requirements:

5.1.2. The system shall have system healthy and system malfunction indication to indicate its status. The system shall be provided with Manual actuation control(s) inside Operator cabin and t outside of operator cabin preferably away from hot zones. Components of the system shall in no way obstruct Operator's line of sight hindering his / her visibility.

5.1.3. The system shall cover all fire susceptible areas including engine, diesel tank, battery box, transmission, exhaust pipe and other hot zones having potential to cause fire.

5.1.4. The system shall be fully automatic, robust and shall not be damaged / made inoperative during routine maintenance activities. Components of system, in particular, sensing elements, shall be adequately protected from external damage. Nuisance heat sensing shall be avoided by the system.

5.1.5. The system, as far as practical, shall be designed in such a way to supply adequate quantity of fire suppressing agent to the zone where the fire is detected and to be suppressed on need basis for effective fire fighting and to avoid re-ignition of fire instead of blind discharge through all discharge nozzles.

6. 0. Dump Body raised position indicator with warning:

A system or a device capable of sensing non-return of dump body to completely retracted & transportation mode, restricting transmission of Dumpers / Tipper trucks, when engaged, up to first gear while the dump body is not completely lowered and simultaneously triggering an audible and/or visual warning till such time the dump body is completely lowered.

Applicability: Dumpers / Tipper trucks

6.1. The Dump Body raised position indicator with warning shall meet the following minimum requirements and standards:

6.1.1. The system shall trigger visual warning sooner Dump body is raised from its retracted cum transport mode. The warning shall remain "ON" till such the time the Dump body is not completely retracted/lowered. The system may have additional mechanical indicator to show that the dump body is not in fully retracted position. The visual warning shall be so located as to be readily visible and recognizable in the daylight and distinguishable from other alerts at night time by the Operator when seated in Operator Seat. As far as possible, the warning indicator shall be integral part of Operator console / Display Panel.

6.1.2. The system shall sound Audio warning in addition to Visual Warning when Dumper / Truck is attempted to move from its stationary position with dump body not in completely retracted position. The system shall not allow engagement of transmission system beyond first gear when the dump body is in raised position.

6.1.3. Sensors of the system shall have Ingress Protection of IP 68 in accordance with IEC 60529 and test Certificates to this effect shall be obtained from any Government / NABL Accredited institutions/Test Houses having adequate test facilities.

7. 0. Exhaust Brake:

Applicability: Dumpers / Tipper trucks / Heavy Vehicles.

7.1. The Exhaust Brake shall meet the following minimum requirements and standards:

7.1.2. The brake shall be an Auxiliary Braking System and shall be compliment but not a replacement to service Brake.

7.1.3. Control forces of the braking system controls and other brake testing requirement shall be in accordance with IS 16479 (*Performance requirements and test procedures of braking systems for wheeled high-speed rubber-tracked Earth Moving Machines and construction equipment vehicles*) stipulated for Retarder. For Heavy vehicles, it shall be in accordance with relevant Automotive Industry Standards (AIS).

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7.1.4. The Brake control shall be provided in the Operator's cabin within the Zone of Reach and distinctly marked.

8. 0. Load Indicators:

An automatic Load sensing, measuring and data logging system to monitor load, to sound warning when loaded beyond its designed safe carrying load and to record the payload during machine operation. The system shall have signaling provision on both sides of the Dumpers / Tipper trucks to indicate the loading status along with indication to the Operator.

Applicability: Dumpers / Tipper trucks

8.1. The Load Indicators for Dumpers and Tippers shall meet the following minimum requirements and standards:

8.1.1. The system shall comprise of onboard automatically load sensing/measuring device, indicating arrangement and warning system.

8.1.2. The system shall have exterior load indicating device(s) (in the form of different light indicators) so that the loader Operator is aware of under load, safe load and Over Loading of the Dumpers / Tippers. The indication shall also be extended to Dumper / Tipper Operator and the indication shall be suitably placed in Operator cabin as easily seen by the Operator without strain and without affecting his outside visibility. The Exterior load indicator shall be provided on both sides of Dumper / Tipper.

8.1.3. The system shall sound Audio warning when safe carrying capacity of Dumper / Tipper is reached. The Warning shall be continuous when the Dumper/truck is overloaded. The system shall not have manual override.

8.1.4. The system shall have Ingress Protection of IP 68 in accordance with IEC 60529 and test Certificates to this effect shall be obtained any Government / NABL Accredited institutions/Test Houses having adequate test facilities.

8.1.5. Light intensity of the Indicator shall be as per the requirements of AVA stipulated by DGMS. Intensity of Audio Warning shall be as per the requirements of AVA stipulated by DGMS.

8.1.6. The System may be provided with provisions for recording the warning generated with time stamp to enable easy retrieval and analysis of the immediate past 96 deployment operating hours.

9.0. Dump Body Stabilizers for Tippers:

The Dump Body Stabilizers for Tippers shall meet the following minimum requirements and standards:

Adequate and suitable mechanical arrangement(s) in the form of stabiliser to prevent toppling of Tipper / separation of dump body of the Tipper from lift cylinder(s) during dumping operation of the Tipper shall be provided in all Tippers. As far as possible, the dump body shall be designed during design phase of Tippers.

10.0. Seat belt and Seat Belt Reminder:

Applicability: Dumpers / Tipper trucks / Light and Heavy Vehicles.

10.1. The Seat belt and Seat Belt Reminder shall meet the following minimum requirements and standards:

10.1.1. Seat Belt

(a) Seat Belt shall be an arrangement of strap(s), 3 point contact type with a securing buckle with quick release, adjusting devices and attachments which are capable of being anchored in Operator's cabin of HEMM.

(b) Seat Belt shall be designed to minimize the risk of injury to its wearer (Operator), in the event of collision or of abrupt deceleration of the vehicle, by limiting the mobility of the wearer's body. It shall be capable of returning to normal operating position sooner the condition(s) causing the risk is/are diminished and shall not hinder normal operations of the Operator.

(c) A cutting arrangement shall be provided in Operator cabin at a place which is easily approachable by the operator/person for cutting the strap in case of jamming of securing buckle during escape / rescue operations in case of any eventualities.

10.1.2. Seat Belt Reminder system

(a) The system shall detect an unfastened safety-belt and initiate two stages of both Visual and Audible alerts, namely, First Level Warning and Second Level Warning.

(b) The visual warning shall be so located as to be readily visible and recognizable in the daylight and distinguishable from other alerts at night time by the Operator when seated in Operator Seat. As far as possible, the warning indicator shall be integral part of Operator console / Display Panel. The Visual Warning shall be flashing tell-tale.

Note 1: "First Level Warning" means a visual warning activated when the ignition switch is engaged (engine running or not) and the Operator's safety-belt is not fastened. An audible warning can be added as an option.

Note 2: "Second Level Warning" means a visual and audible warning activated when a Operator operates a vehicle without fastening of Operator safety-belt.

Note 3: Reference for Test requirements: AIS 145 (for appropriate N type vehicle) or any other acceptable international automotive standards

11. 0. No Bump Circuit for Drills:

The No Bump Circuit shall meet the following minimum requirements and standards:

A system capable of automatically bringing down and maintaining speed of vertical travel and rotary motion of rotary mechanism automatically to predetermined safe level(s) during drill rod connection between rotary and drill rod and between drill rods irrespective of speed selection by Operator of Drill machine. The No Bump Circuit shall provide for such speed(s) during the above mentioned connections so as to avoid damage to threads of pipe(s) and rotary heads.

26/2/2020

12. 0. Breakout Wrench for Drills:

The Breakout Wrench shall meet the following minimum requirements and standards:

12.1. The wrench shall be of adequate design and construction and shall be capable of breaking out tightly threaded Drill Rod Connections safely and operated from Operator cabin of the Drill. Break out wrench shall be mounted in the machine and is in addition to normal arrangement provided to break out threaded drill rod connections. For smaller diameter Drill pipes and machines intended for drilling holes for secondary blasting, a portable Break out wrench arrangement may be used.

12.2. The wrench shall have provision to automatically adjust its jaws to diameter of Drill rod to compensate for any drill pipe wear and shall be provided with mechanical locking arrangement to secure the wrench at its resting position. The wrench shall be so installed as not to affect Operator's visibility to Drill Rods / Drill Platform.

12.3. Adequate safeguard shall be provided to prevent accidental / inadvertent actuation of controls in Operator's Cabin.

13. Propel joystick-spring loaded type to return to neutral (Dead-man safety) for Drills:

The Propel joystick-spring loaded type to return to neutral (Dead man safety) shall meet the following minimum requirements and standards:

It shall be capable of returning to deactivated (Neutral) position automatically upon release of lever by Operator and shall immediately bring propel / tramming operation of the Machine to Halt and safe state.

14.0. Proximity Warning Device:

A system designed for early detection of static and moving objects, vehicles, human beings encountered within virtual target area during movement of Dumper / Tipper and for triggering warning the operator to prevent collision or run over. The system shall comprise sensors which may employ one or more or combination of technology / methodology (for detection of objects, vehicles, and human beings), control unit(s) (for receiving input from sensor(s), processing it and forwarding necessary input to Warning Unit) and warning unit to trigger Audio visual warning to the operator. The system shall have variable target area during forward movement depending upon speed of the Dumper / Tipper and predetermined target area during rearward movement.

Applicability: Dumpers / Tipper trucks

14.1. The Proximity Warning Device shall meet the following minimum requirements and standards:

14.1.1. Proximity warning device / system shall be provided for detecting static and moving objects including human beings on its own during the vehicle movement for a specified range, and warn the operator in the operator's station.

14.1.2. At least one object detection sensor, accessible and not interfering with the Dumper's / Truck's operation shall be provided both in the front and at rear of the Dumper / Truck at suitable locations. The system shall be ergonomically designed and mounted for operator and maintenance personnel.

14.1.3. The system shall be reliable and be able to provide an adjustable audio visual warning when it detects static and moving objects including human beings, least height light motor vehicle used in the mine, etc., within the virtual target area of respective Dumper/Truck.

14.1.4. The sensor shall detect static and moving objects in a virtual target area as defined below. The manufacturer shall ensure maximum possible detection coverage in the virtual target area depending on the available fitment area and proximity detection technology defined as below:

14.1.5. **Virtual Target Area in Front of Dumper/Truck:**

(a) Width of the virtual target area shall be equal to the width of the Dumper/Truck plus 0.5m on both sides.

(b) The inner edges (base line) that represent the width of the virtual target area shall pass through the inner edge of bumper of Dumper/Truck. The centerline of the virtual target area and the Dumper/Truck centerline shall coincide.

(c) Length of the virtual target area shall conform to maximum stopping distance as mentioned in the IS: 16479 (*Performance requirements and test procedures of braking systems for wheeled high-speed rubber-tracked Earth Moving Machines and construction equipment vehicles*) and the length of virtual target area shall be calculated by the Control Unit of the system dynamically and automatically with relation to vehicle's speed at any given point of time while covering the blind spot distance observed within the width of virtual target area when the Dumper / Tipper was in static pre-start (ignition – on) condition. While calculating stopping distance in accordance with IS 16479, the test slope percentage may be taken as 6.25 % (i.e. 1 in 16, which is maximum permissible slope of haul road under normal operating conditions). Further, Brake response time and operator response time shall also be considered while calculating the stopping distance.

14.1.6. **Virtual Target Area in Rear of Dumper/Truck:**

(a) Width of the virtual target area shall be equal to the width of the Dumper/Truck plus 0.5 m on both sides.

(b) Length of the virtual target area shall be more than or equal to the length of the Dumper/Truck.

(c) The inner edges (base line) that represent the width of the virtual target area shall pass through the centerline of the rear axle of the Dumper/Truck.

(d) The centerline of the virtual target area and the Dumper's/Truck's centerline shall coincide.

14.1.7. The system shall not detect any obstacles beyond the width of the virtual target area and its detection area shall be restricted along the vehicle's pathway for minimizing false alarm. The system shall have intelligent alert generating mechanisms like indication of obstacle in the vehicle's pathway, whether left, right or center and triggering audio alerts after detection of obstacles of auto-cut off type, to avoid operator inconvenience/distraction. The System shall be provided with provisions for recording of details of warning generated with time stamp with location details (if feasible) to enable easy retrieval and analysis of the immediate past 96 deployment operating hours.

14.1.8. The system shall be tested at any Government approved laboratories or Test houses accredited by NABL subject to confirmation of its ability to conduct such tests conforming to following Standards (or its revised versions) and the test house shall not be part of Manufacturer's testing facility.

(a) IEC 61000-4-5:2014 - Electromagnetic compatibility (EMC): Testing and measurement techniques - Surge immunity test.

(b) IEC 61000-4-6: 2013 - Electromagnetic compatibility (EMC): Testing and measurement techniques - Immunity to conducted disturbances, induced by radio frequency fields.

(c) JSS 55555:2000(Rev-2) - Sinusoidal Vibration Test, Frequency: 8 to 500 Hz, Acceleration: 40m/s^2, Duration 2 hrs in each axis.

(d) IS-9000: Part-V/Sec 1 - 1981 Reaffirmed 2007 - Damp Heat Test (at 40° C & 95% RH for 16 Hrs).

(e) IS-9000: Part-II/Sec 3 - 1977 reaffirmed 2004 - Cold Test (-10°C).

(f) IS-9000: Part-III/Sec 3 - 1977 reaffirmed 2004 - Dry Heat Test (+70°C).

(g) IS-9000: Part-XIV/Sec 2 – 1998- Rapid Temperature Cycle Test.

(h) Ingress Protection Test, IP-66 required;

14.1.9. Rules/guide lines framed by Ministry of Communications and Information Technology (Wireless Planning and Co-ordination Wing), wherever applicable, shall be complied. The technology / technologies of the system shall also comply with other applicable statutory guidelines framed under various Rules /Regulations / Acts by Government of India.

26/2/2020

(R. Subramanian)
Director General of Mines Safety (Off.)

सत्यमेव जयते
भारत सरकार / Government of India
श्रम एवं रोजगार मंत्रालय / Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय/Directorate General of Mines Safety

DGMS Technical Circular No. ...04.. of 2020, Dhanbad, 24th February, 2020

To

Owner/Agent/Manager of belowground coal mines.

Subject: Prevention of inflammable gas hazards in belowground coal mines - reg.

1.0 Accidents/disasters in belowground mines due to methane (generally termed as 'Gas') ignition and explosion are well known for many centuries in the coal mining history. Indian Belowground coal mines are no exception and have a number of gas-related accidents/disasters on record. History, by far, have revealed the lack of adequate precautions to deal with the unpredictable nature of mine gas emissions during mine development and coal extraction, particularly by the Longwall caving method, as the major causative factor of such accidents/disasters. Recent gas-related incidents in belowground coal mines have prompted to review the adequacy of the Coal Mine Regulations 2017 to safeguard the mineworkers from gas hazards, especially, of Jharia and Raniganj coal seams which are highly gassy in nature.

2.0 Globally, over the years, a significant body of knowledge has been developed in understanding the prediction of gas emission in belowground coal mines and effective techniques have been developed and successfully implemented to mitigate gas problems. Knowledge of the gas occurrence, emission characteristics and expected gas flow from a coalmine as a function of the coal production rate are therefore, the essential ingredients of safe operations, mine planning, ventilation, gas utilisation, Greenhouse gas (GHG) emission control purposes, etc. Coal extraction and effective gas management will become increasingly challenging as shallow coal reserves are exhausted and deeper and gassier seams are being mined.

3.0 In view of the above, the following measures are suggested for the prevention of gas hazards in belowground coal mines.

3.1 **Determination of degree of gassiness:** This is the first step to reduce hazards due to gas emissions during the mining process. Merely knowing the degree of gassiness of the coal seam only gives a probability of gas emissions which changes with coal production technology, barometric pressure, fan failure, roof falls, etc.

Hence, the gassiness of coal seams shall be determined on a scientific basis by measurement of in-situ gas content of working seams, overlying and underlying seams and immediate coal measure strata. The gas content of a coal seam shall be determined by appropriate scientific methods by taking freshly cut coal cores either from surface drilling or UG drill bore cores, as may be applicable, and sealing the cores in a canisters and carryout gas desorption measurements by well known national/international standards like 'Determination of Gas Content of Coal and Carbonaceous material - Direct Desorption Method' (AS 3980-2016 or ASTM D7569 / D7569M-10(2015)e1). The measured gas content data need to be interpreted for gas reservoir size and estimation of gas emission rates during mine development and production cycles.

24/2/2020

3.2 **Ventilation Planning:** knowledge of the gas occurrence, emission characteristics and expected gas flow from a coal mine/panel as a function of the rate of coal production is essential for ventilation planning. In some mines, a gas emission to the tune of 36 m^3/t of coal had been reported, which is a potential for outburst conditions. To dilute such a high gas emission rates to the safe level of <1.25% CH_4in general body air and <0.75% CH_4in return airways of the district by increasing quantity of intake air may lead to a very high air velocities at Longwall face due to limited maximum span of the face causing dusty atmosphere and leakage of more air into the goaf that leads to spontaneous combustion problems and further potential increase in gas percentage in the return airways. Hence, it is necessary to determine the gas outburst threshold limits for the pre-drainage of the coal seam to safe limits before mining the coal.

3.3 **Gas drainage:** A suitable pre-mining methane drainage system shall be adopted in coal seams with gas content > 10 m^3/t to reduce gas content of coal seam below the critical level to achieve safe belowground working conditions and for improving panel ventilation. The pre-gas drainage system also takes care of the gas blowers and outbursts encountered during mining of seam having high gas contents, low-permeability zones and geological structural features such as faults or shear zones.

The mine Owner/ Operator/ Contractor may characterize the gas reservoir size (i.e. cu.m of gas per sq.m. area, m^3/m^2) to determining the pre-drainage requirements before initiating the production activities, to ensuring that mining activity and ventilation planning match with the planned production with due regard to safe operations belowground.

3.4 **Monitoring:** A Tele-monitoring system having a sensor for continuous monitoring of methane (CH_4) and carbon monoxide (CO) at the face, goaf edges and in the return airway of the panel may be provided and maintained in every mine having seams of 2nd and 3rd-degree gassiness. A telemonitoring sensor may be installed at the immediate return of the longwall panel/depillaring panel to detect the presence of inflammable and noxious gases continuously and having a feature to automatically cut off power in case the percentage of CH_4 exceeds 0.75% and noxious gases exceed 50ppm along with the automatic alarming system.

In addition, Local Methane Detector (LMD) to trip the power supply at 0.75% methane may be installed just out bye of the Longwall face in the return airway and LMD to trip the power supply at 0.5% methane may be installed at the Longwall face. The methane sensor of the telemonitoring system and LMD may be placed within 1.0m of the roof. Approved type of methane monitors installed on the shearer/cutting machine as required under Reg. 214(2) of CMR, 2017, shall be kept functional which shall record inflammable gas continuously and trip the power of the face equipment if the percentage of CH4 gas exceeds 0.5%.

3.5 **Ignition of gas:** In all the mines having seams of 2nd or 3rd-degree gassiness, the cutter drum having water spraying arrangement with a jet directed towards the tip of the pick shall only be provided to prevent a generation of frictional spark and the subsequent possibility of ignition of the gas.

A nitrogen/carbondioxde plant may also be installed at the surface of every mine having seams of 3rd degree gassiness with intricate network of connected pipelines for conveying nitrogen/carbondioxide gas within the mine. An automatically operated fire suppression device shall be provided at every face cutting machine as required under Reg. 139(1)(f) of CMR, 2017.

3.6 **Post goaf drainage:** The post goaf drainage plans may be prepared, formulated and implemented in every mine having gassy seams of 2nd and 3rd degree for safe periodical drainage of gas accumulated inside the panel after its extraction and sealing for the safety of the mine workings.

3.7 **Gas Hazard Safety Management Plan:** In all belowground gassy mines of 2nd and 3rd degree, a safety management plan also containing the following elements of the principal gas hazard management, shall be prepared, monitored and reviewed periodically.

- Emergency Response;
- Gas emission assessment and determine gas content threshold limits;
- Gas Monitoring;
- Mine ventilation planning;
- Methane drainage i.e. Pre- and post drainage plans;
- Outburst management;
- Prevention of Gas ignition;
- Spontaneous combustion.

Every belowground coalmine shall prepare, formulate and implement a 'Gas Emission Control and Management Plan' and 'Emergency response and evacuation plan'.

All Owners, Agents and Managers of belowground coal mines are advised to ensure compliance of this circular. It is also advised that wherever new belowground mines/belowground mining operations are planned, the scope shall include gas reservoir studies, gas emission modelling and gas drainage plans.

24/2/2020

(R. Subramanian)
Director General of Mines Safety

सत्यमेव जयते

भारत सरकार
Government of India
श्रम एंव रोजगार मंत्रालय
Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय
Directorate General of Mines Safety

No. DGMS (Tech) Circular (MAMID)/08 Dhanbad, dated 29/04/2020

To,

The Owner, Agent and Manager of all Mines

Subject: Recommendations of 12th National Conference on Safety in Mines held on 28th & 29th January, 2020 at New Delhi.

You are aware that the 12th National Conference on Safety in Mines was held on 28th & 29th January, 2020 at New Delhi. Besides reviewing the status of implementation of the recommendations of 11th National Conference on Safety in Mines, the Conference deliberated upon and made valuable recommendations on the following subjects:

1. Electrical safety – Recent trends, Strategy for improvement.
2. Role of information technology in mining sector.
3. Prevalence of pneumoconiosis/silicosis amongst workers, present status of dust control measures and strategy for improvement.
4. Strategies for disaster prevention in coal mines.
5. Occupational safety and health issues of contractual workers- Strategy to improve safety and health status.

The recommendations of the Conference as enclosed, as annexure are hereby being brought to your attention for information and necessary action.

24/04/2020

Director General of Mines Safety (Officiating) and
Chief Inspector of Mines,
DGMS, Dhanbad.

Annexure to DGMS (Tech) Circular (MAMID)/08 Dhanbad, dated 29/04/2020

Recommendations of 12th National Conference on Safety in Mines held on 28th & 29th January, 2020, at New Delhi.

1.0 REVIEW OF STATUS OF IMPLEMENTATION OF RECOMMENDATIONS OF 11TH NATIONAL CONFERENCE OF SAFETY IN MINES HELD ON 4TH AND 5TH JULY 2013.

1.1.1 Indigenous manufacturers should be encouraged to manufacture necessary safety related equipment's.

1.1.2 In specified underground mines where long or arduous travel is involved, arrangement for transport of men should be made with a target of 20 % every year.

1.1.3 In respect of small-mechanized mines, which are operating in NON-COAL sector, it may not be feasible for a small organization to create a special department on Occupational Health Services. For such small mines, it is suggested that an Association of small mines operators creates common facilities and infrastructure for occupational health services. Creation of such facilities is specially needed for asbestos, manganese and mica mines.

1.1.4 Development of a portable instrument for detecting hidden slips in roof of COAL mines should be taken up on priority by R&D organizations. The instrument should be developed by S&T project which should be guided by a committee consisting of an officer from DGMS and others from COAL Industry and Research Organizations.

1.1.5 In case of smaller mines, such arrangement may be made by association of mine operators.

1.1.6 Considering the risk of fire, all COAL mine companies shall rank its COAL mines on a uniform scale according to its risk from fire on scientific basis. Guidelines may be framed by DGMS and circulated to all mining companies.

1.2 Safety issues in mines of un-organized sector

1.2.1 In case of stone quarries on hillocks, whole of the hillock should be given out as a single lease so that necessary development could be done from top downwards after making approach road to reach to top of the hillock before starting extraction of stone/removal of overburden. A condition to this effect may be incorporated before granting such leases.

1.2.2 In the lease document, reference should be made to the Mines Act and the Rules and Regulations made there under for compliance. The DGMS may prepare, in consultation with Ministry of Mines a model document for grant of leases by the State Government so that the conditions of leases are such that there is a uniformity and compliance with central laws.

1.2.3 A copy of the lease document should be sent to the DGMS and the lessees explicitly be asked to send notice of opening of the mine to DGMS in accordance with the Provisions of the Mines Act.

1.2.4 The Conference has noted that there have been instances in some States where leases have been granted in close proximity of inhabited area and within 45 m. of Railway acquired land and land acquired for National and State highways, public works without consulting the appropriate statutory authority. The conference recommends that the States may grant mining leases in conformity of Central Laws.

1.2.5 DGMS should organize Orientation Programs for officers of State Mines and Geology Departments to inform them about safety laws.

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1.3 Occupational Health surveillance and Notified Diseases

1.3.1 Ergonomical assessment of all latest machines, before their introduction into mining operation as per ISO standards. Ergonomical assessment should include:

* Assessment of work process.
* Assessment of working Aids/tools
* Assessment of working posture.

1.3.2 For smaller mines where PME facilities are not existing, medical examinations can be done through other competent agencies.

1.4 Mechanization with view to phase out manual loading etc.

1.4.1 Possibility of deployment of multi-skilled miners in the green roof/hazardous areas shall be explored to reduce the exposure at hazardous areas without affecting employment.

1.5 Below ground communication and tracking system

1.5.1 Mining companies in collaboration with research institutions/equipment manufacturers shall initiate and fund for, suitable research initiatives for establishment of appropriate communication system for below ground mines including to locate the trapped miners.

1.5.2 Mine management in collaboration with equipment manufacturers shall evolve a system of proximity warning device in HEMM and initiate measures for its implementation.

1.6 Implementation of ILO convention No. 176 in Mines

1.6.1 The committee decided that a separate discussion be held by the Govt. of India in a tripartite forum to deliberate on the implications arising out of ILO Convention No. 176.

1.7 Small Scale Mining

1.7.1 The concerned authority in State Government may grant prospecting lease/mining lease/ mining right after ascertaining technical feasibility of mineral extraction in pursuance of provisions of the mining law, so that the lessee can make medium to long-term plan for investment in infrastructure and work the mines in a safe and scientific manner. While conducting of mining operations, it should be ensured that the Central Laws, including the Mines Act are complied with.

1.7.2 The State Governments may explore the feasibility of demarcation of mining zones to avoid problems of growing habitation encroaching into the mining area, thereby creating unsafe and unhealthy conditions. However, the State Government may take efforts to relocate the habitation already existing near mining zones.

1.7.3 The lease granting authority of State Government may assign a unique identification number, which will serve as a common reference for all central and state authorities responsible for administration of central and state laws.
The details of lease may be displayed in a board of permanent nature in a prominent place in the lease hold area showing following:

a. Name of lessee and postal address:
b. Lease number:
c. Period of lease:
d. Unique identification number:

1.7.4 The lease granting authority of State Government may insert a clause in the lease document requiring the lessee to submit a notice of

- (i) commencement of any mining operation, and
- (ii) appointment of a manager, prescribed under the Mines Act, 1952 and Rules and Regulations framed there under.

1.7.5 The concerned authorities of State Government may be requested to explore the possibility of introducing a course in Mining at Industrial Training Institutes in consultation with DGMS to augment the requirement of Mining Mates.

1.7.6 Orientation Programs may be organized for officers of State Mine and Geology Departments on OSH Laws.

1.7.7 Organized mines of public and private sector may consider extending their facilities in Vocational Training, Occupational Health Surveillance and other Safety Awareness Programs for workers engaged in small scale mining sector.

1.7.8 As a promotional initiative, social dialogue and deliberations at appropriate level may be initiated to facilitate formation of Cooperative Society/Mine Owners Association to tackle issues of resource and logistics management essential for safe and healthy mining.

1.7.9 The Conference appreciates the efforts made by Ministry of Labour and Employment and Directorate General of Mines Safety for encouraging and adopting innovative means to create awareness about OSH issues and improving compliance in small scale mining sector with public private interventions. It is recommended to continue with such initiatives vigorously and in enhanced manner.

1.7.10 The concerned authorities may explore possibilities of setting up of Mine Workers Welfare Boards for minerals like sandstone, marble and granite.

1.8 Safety, Health and Welfare of Contractual Workers.

1.8.1 Central Government should take steps against non-compliance of the Recommendations of the National Safety Conferences.

1.9 Surface and Underground Transportation Machinery:

1.9.1 MACHINERY FOR SURFACE OR OPENCAST OPERATIONS

1.9.1.1 Safety Features in HEMM : GPS-GSM Based Navigation System
The GPS-GSM based vehicle navigation system shall be used in large mines in a phased manner.

1.9.1.2 Skill Development and Training: General Skill Development programme should be undertaken for training of operators and all other associated staffs using state of the art technique including simulation and 3D Virtual Reality system.

1.9.1.3 Protection against Fatigue: Long or Extended Hours of driving beyond 8 continuous hours with a rest interval of half an hour after four hours of continuous operation, shall not be permitted, for which biometric system of check-in & check-out system of attendance associated with suitable software shall be introduced in the mine.

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1.9.2 TRANSPORTATION MACHINERY IN UNDERGROUND:

1.9.2.1 All steam winders should be replaced with electric winders in phased manner within a period of five years.

OR

Alternate access to the mine in the form of Inclines or Shafts may be considered and implemented within the same period.

1.9.2.2 Safety Features in Winding: Detailed survey of all winding installations which completed 20 years shall be carried out by a committee of experts and its recommendations shall be implemented.

2.0 ELECTRICAL SAFETY – RECENT TRENDS, STRATEGY FOR IMPROVEMENT

2.1 Shutdown procedures with lock out and tag out system with a provision of multiple lock, displaying the person's name, designation and photo shall be implemented. When any switchgear cannot be locked out, the same shall be modified or replaced to make it capable of being locked.

2.2 Specific category wise training shall be imparted to all electrical personnel whenever- a new electrical machinery/apparatus is introduced, change in jurisdiction of job/Profile, change in the working voltage and Change in working place (Below Ground / opencast/surface installation), etc.

2.3 The contractor engaged for any electrical installation, maintenance, repairs, etc., should possess a valid electrical contractor license issued by the state licensing board and engage adequate number of competent Electrical personnel. It shall be included in Terms and conditions of contract agreement / NIT (Notice Inviting Tender) and shall be ensured by the principal employer.

3.0 ROLE OF INFORMATION TECHNOLOGY IN MINING SECTOR

3.1.0 At every working mine, the Owner shall ensure the following in respect of employment of persons.

3.1.1 Details of every Initial/Periodical Medical Examinations conducted and Initial/ Refresher Vocational training provided to persons employed in mine(s) are uploaded onto an appropriately designed Digital platform on a non-editable mode and also linked to the individual's 'Aadhaar number' so as to be amenable for quick retrieval and for portability wherever required.

3.1.2 The register of employees in Form-A are maintained in Digital form, along with Digital linkage to details in non-editable form of Initial/Periodical Medical Examinations conducted, Initial/Refresher Vocational training provided and individual's 'Aadhaar number' for every entry made therein.

3.1.3 'Biometric Attendance system' for the purpose of booking attendance of all persons employed in the mine(s) is provided at locations as may be fixed by the Manager in writing to ensure that only those persons with entry in the Digitized Form-A register of employment as mentioned above can book attendance to gain entry into the mine(s). Entries made in the Biometric Attendance system' shall be retained permanently and shall be easily amenable for quick retrieval when required. Wherever possible 'Aadhaar number based Biometric Attendance system' shall be implemented for booking attendance.

3.1.4 For on the spot easy identification while working in a mine, every person employed is issued smart Digital tokens containing his/her complete Form-A Register entry.

3.2.0 At every mine with deployed machinery including electrical machinery, the Owner shall ensure the following in respect of deployment and operation of machinery in the mine.

3.2.1 Every deployed machinery shall be identified by a unique and mine specific 'Machinery Reference Number (MRN)'. All technical details of such machinery shall be made available on a customized Digital platform for easy retrieval when required.

3.2.2 Every deployed machinery is accompanied by a Digitally generated pre-deployment fitness certification duly signed by the concerned mine official.

3.2.3 Excepting in case of any emergency or other such situations to be recorded in writing by the Manager, no machinery without a valid MRN shall be deployed in the mine.

3.2.4 In respect of operation of such machinery, a comprehensive Digitized system shall be developed for

3.2.4.1 making available the details of actual deployment to the shift officials within 15 minutes of the commencement of the shift working hours;

3.2.4.2 initial examination of such machinery by the engaged operator as per check-lists formulated in accordance with various DGMS guidelines, OEM stipulations, etc., and entering the findings through Digital kiosks/tools;

3.2.4.3 dissemination of the report of such initial examination to all concerned officials as may be decided by the Manager for ascertaining safe operating conditions of the machinery;

3.2.4.4 regular maintenance at stipulated intervals as per OEM stipulations/other guidelines and entering of records thereof in the Digital history sheet of the machinery and

3.2.4.5 making all information Digitally available to all concerned mine officials.

3.2.5 A system of Digital tracking of all transportation machinery while in operation within the mine boundary shall be deployed.

3.3.0 At every mine, the owner shall arrange to develop and implement a comprehensive digital system in respect of,

3.3.1 reporting by the engaged machine operators, technicians, supervisors and statutory officials in non-editable form so as to be amenable for immediate scrutiny by concerned persons at multiple levels in the management hierarchy;

3.3.2 recording various statutory and non-statutory monitoring activities pertaining to mine environment including that of sealed-off areas in belowground mines, ground movements, condition of operating machinery, etc., so as to be instantaneously available for multi-level scrutiny, supervision and analysis,

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3.3.3 statutory mine plans, sections, records, returns, registers, etc., in such a manner that they are always kept updated and available for scrutiny/examination at multiple levels in non-editable form,

3.3.4 all purchase/procurement activities at the mine which could have adverse impact on safety due to any delay, and

3.3.5 availability of mines rescue equipments, trained manpower, etc., so as to ensure instantaneous mobilization for effective management of mine accidents/disasters.

3.4.0 Every State/Central Government/Authority vested with the responsibility of issue of mining/quarrying lease shall formulate a comprehensive Digital policy which will allow

3.4.1 availability of details of all active and valid mining/quarrying leases including the GIS (Geographic Information System) coordinates of all points of the lease demarcated by the State Authority on a common web-based platform for easy access / sharing amongst stake holders,

3.4.2 for sharing of all information on production, employment, etc., and contact details of lease holder amongst all stake holders and

3.4.3 archival at District level of booked Digital attendance through Biometric system in mines for being easily accessed.

3.5.0 Wherever there exists poor network connectivity, standalone systems shall be continued till network connectivity issue is resolved.

4.0 PREVALENCE OF PNEUMOCONIOSIS/SILICOSIS AMONGST WORKERS, PRESENT STATUS OF DUST CONTROL MEASURES AND STRATEGY FOR IMPROVEMENT

4.1 Permissible respirable dust levels be brought down to 1.0 mg/m3 (In case percentage of free Silica in Mines is up to 5) or 5 divided by percentage of free Silica in Dust, from the present level, in the line of prescribed limits of National Institute for Occupational Safety and Health (NIOSH), USA.

4.2 For early detection of Silicosis amongst Miners of Stone quarries, Medical examination should be conducted at least once in every year and Chest Radiography once in every two years.

4.3 All mining companies shall have the services of at least one Doctor qualified in OH and trained in ILO classification of chest radiographs. DGMS may facilitate necessary training, if needed.

4.4 In order to establish a close employer-employee relationship, Mine owners should try to keep the contractual workers on permanent basis as far as practicable, and not to change the workforce frequently. Their details shall be maintained in form A (Register of Employees) and they should be provided with all the benefits due to them, statutorily and otherwise.

4.5 State Government shall create facilities like Chest Radiography (X-ray machine 300 mA or more), Spirometry, Audiometry, Blood Biochemistry etc. at Primary/Community Health Centres and also get their Doctors trained in OH and ILO Classification of Chest Radiograph, if necessary with the funds available under District Mineral Fund (DMF).

4.6 There shall be at least one referral occupational health centre established in every state, for confirmation and tertiary care of Pneumoconiosis cases.

4.7 For getting further insight into various other occupational lung diseases due to dust, Diesel Particulate Matter, etc. appropriate scientific agencies may be engaged.

4.8 To create awareness amongst the workers about the dust related disease, mine management shall conduct structured training and awareness programmes at regular intervals.

4.9 Every mine owner shall submit a quarterly return relating to measures taken to prevent generation of respirable dust at all work places in the mine.

5.0 STRATEGIES FOR DISASTER PREVENTION IN COAL MINES

5.1 The Safety Management Plan (SMP) of every mine shall give adequate priority on developing the Principal Hazard Management Plan (PHMP) based on Risk Assessment and shall provide suitable organizational structure with adequate resources for reducing the risk level as low as reasonably achievable. It shall also be ensured by the owner, agent and manager of every mine that mitigation of such identified principal hazards on an auditable mode is done in accordance with DGMS (Technical) Circular No 3 of 2019dated 23.12.2019.

5.2 The Safety Management Plan (SMP) of every mine shall include specific guidelines for emergency withdrawal and re-entry protocol based on Triggered Action Response Plan (TARP) for all principal hazards having potential to cause multiple fatalities.

5.3 The owner, agent and manager of every mine shall encourage their employees to report and record all cases of near-misses/incidences, not resulting in any injury or loss of property but having the potential to cause serious harm to person(s) or property in the mine. It shall also be ensured by the owner, agent and manager that:-

5.3.1 all near-misses or incidences are properly enquired by an official of the mine who shall also make appropriate recommendations for preventing recurrence,

5.3.2 such recommendations are circulated by appropriate mechanisms including digital/electronic mode, to every other mine of the same owner and also amongst other mines of other owners, to create awareness and for designing suitable preventive strategies, and

5.3.3 a properly structured accident/incident management system is evolved under the Safety Management Plan with the basic objective of preventing recurrence of similar such incidences in mines.

5.4 The owner, agent and manager of every mine shall ensure that

5.4.1 all immediate steps as may be required after an accident in a mine, including first response like rescue, recovery and medical aid, containment of further escalation or worsening of hazardous conditions and quarantining the place of accident, are carried out,

5.4.2 every case of accident/incident including near-miss is enquired into for finding out root cause(s) using suitable 'root cause analysis techniques',

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5.4.3 appropriate corrective actions are suggested using the principle of hierarchy of controls (elimination / substitution / engineering / separation / administrative/ PPE) in respect of all root causes identified through root cause analysis technique, and

5.4.4 specific, measurable, accountable, reasonable, timely (SMART) and effective recommendations are made for implementation and necessary follow-up thereof.

5.5 The manager of every mine shall ensure that all pre-warning signals are thoroughly investigated with an aim to find out subsequent consequence(s) by adopting the culture of risk assessment with commitment and leadership of the top management. The prevailing risk shall be mitigated by using the principle of hierarchy of controls.

5.6 It shall be ensured by the owner, agent and manager of every opencast mine that adequate arrangements exist for dealing with such kinds of emergencies as may be arising at the mine. They shall also establish and maintain a close liaison with agencies like NDRF, SDRF or similar agencies for effectively managing such emergencies. It shall also be ensured that joint exercises are conducted at regular intervals with such agencies so as to ensure the preparedness to deal with actual cases of emergencies.

6.0 OCCUPATIONAL SAFETY AND HEALTH ISSUES OF CONTRACTUAL WORKERS- STRATEGY TO IMPROVE SAFETY AND HEALTH STATUS

6.1 Any worker or official, while on duty in active zone of a mine (where any mining operations are being carried out) shall not carry mobile phone. Every mine shall have provision of safe keep storage of mobile phone at suitable place(s). In emergent situation the manager may allow any person or a category of persons to carry mobile phone in such zone.

6.2 The contractor workers shall be provided with proper residential facilities outside active zone of the mine. For the purpose, wherever feasible, the principal employer shall, either construct suitable accommodation facilities for the contractual workers or provide a suitable land/site to the contractor to build the residential facilities with all basic amenities. On completion of the contract, the contractor shall hand over the land/site to the principal employer.

6.3 The manager of every opencast mine shall frame and implement Standard Operating Procedures (SOP) in respect of regulating vehicle deployment density on the basis of appropriate Risk Assessment procedure.

6.4 No person shall be engaged in any job in a mine unless his skill has been assessed by the management through a well-defined process.

6.5 Modern gadgets and equipment e.g. training videos, simulators, virtual reality (VR) etc. shall be used for skilling and up skilling of existing and newly appointed contractual employees.

24/04/2020

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सत्यमेव जयते
भारत सरकार
Government of India
श्रम एवं रोजगार मंत्रालय
Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय
Directorate General of Mines Safety

No. DGMS (Legis.) Circular No. 02 of 2017 Dhanbad, dated 06/11/2017

To

All Owners, Agents and Managers of Coal Mines

Subject: Standards of illumination in opencast coal mines

Sir,

In pursuance of Regulation 154(2) of Coal Mines Regulations, 1957, the standards of illumination to be provided during working hours at different places or areas where natural light is insufficient in opencast coal mines have been specified vide Government notification no. GSR-617(E), dated 28.04.2017, published in the Gazette of India dated 21.06.2017, part II, Section 3(i). The Notification is reproduced below for guidance and strict compliance in all opencast coal mines.

"**Notification**

Dhanbad, the 28th April, 2017

G.S.R. No. 617 (E).---- In exercise of the powers conferred on me as Chief Inspector of Mines, under clause (b) of sub-regulation (2) of Reg. 154 of the Coal Mines Regulations, 1957, I, in supersession of Notification No. GSR-804, dated 18th June, 1975, published in the Gazette of India Part II, Section 3(i) on 28th June, 1975, hereby specify that the standards of lighting to be provided during working hours at different places or areas, where natural light is insufficient in opencast coal mines shall be in the manner as specified in the following table and in conformity with the general guidelines for illumination mentioned thereunder:

STANDARDS OF ILLUMINATION IN OPENCAST COAL MINES

Abbreviations- V: Vertical; H: Horizontal

Serial No.	Place/Area to be illuminated	Minimum standards of illumination to be provided (in lux)
1	Work place of Heavy Machinery	15 H, 25 V (so as to cover depth and height through which the machine operates.)

2	Drilling operations	
	(i)Area where drilling rig works	25 V (so as to illuminate full height of the drilling rig)
	(ii)Area where drill holes exists	15 H
3	Places where manual work is done	15 H, 25 V
4	Places where loading, unloading or transfer, loading of dumpers, trucks or train is carried on (including OB Dump and Coal Stack Yard)	15 H, 15 V
5	Operators cabins of machines or mechanisms	50 H at all places of operation
6	Haul roads for Trucks and Dumpers	10 H
7	Rail haulage track in the pit	10 H
8	Roadways and footpaths from bench to bench	10 H
9	Permanent paths for use of persons employed etc.	10 H
10	In-pit Crusher/Feeder Breaker	40 H
11	Hand Picking Points	50 H
12	Conveyers	
	(a) Transfer points and drive/tail end area	40 H
	(b) Along conveyor	20 H
13	Coal Handling Plant	
	(a) Places of crushing, screening, segregation and loading/unloading	40 H
	(b) Operation points	50 H
	(c) Other places (in general)	20 H
14	Pumping Station	40 H
15	(i) Electrical Sub-station	100 H, 50 V
	(ii) Other places of operation of electrical apparatus/equipment	20 H, 20 V
16	First Aid station	50 H
17	Rest shelter	30 H
18	Workshop	100 H, 50 V
19	Parking Yard	50 H
20	General working areas as determined by the Manager in writing	10 H at the level of surface to be illuminated

Guidelines for mine illumination

1. The mine lighting should be designed and installed with proper lamps and fixtures in regard to height, orientation, spacing and reflectors or other accessories, so as to secure a uniform distribution of light on the work area for visual comfort and avoiding objectionable shadows, sharp contrasts of intensity, glare, light clutter (excessive groupings of light) and light pollution to prevent strain on the eyes of the workmen, work fatigue and medically defined stress.
2. Portable lighting shall be provided at places, where the permanent/fixed lighting is not possible.
3. At strategic locations like electric substation, and any other places as determined by the Manager, emergency lighting arrangement by separate source shall also be provided.
4. In case of haul roads, orientation of light fittings should be kept so adjusted as to have emittance of light across the road and not along the road. Where the width of haul roads is more, the lighting arrangements shall be provided either by rows of lights erected on both sides of the road or by a centrally erected row over the divider, so as to maintain illumination as per standard.
5. Lighting arrangement at working places of heavy machineries, dump/stack yard and other loading/unloading areas shall be such that the formation of dark zone is avoided.
6. Considering high mobility of hydraulic excavators, the faces/benches worked by such machineries shall, as far as practicable, be illuminated by light source of matching mobility so as to avoid chances of lag for want of shifting.
7. Dump/stack yards shall be illuminated by suitable numbers of high mast towers/light source. It shall also be ensured that adequate light reaches up to edges of the active dump.
8. For better implementation of these standards, the manager of every mine shall formulate a detailed written "Illumination Scheme", which may include an "Illumination Plan" and duties and responsibilities of Key officials for the purpose.
9. In respect of any particular place or operation in a mine, where due to existence of some special conditions the manager is of the opinion that compliance as per stipulated minimum standard is not reasonably practicable, he may provide illumination in variance thereof, if he has indicated the modified minimum illumination to be provided for such place or operation, as the case may be, in the "Illumination Scheme" with proper justification for the same and submitted a copy thereof to the Regional Inspector.
10. Illumination Survey:
    - (i) The manager of every mine shall arrange to conduct Lighting Survey once at least in every month to ensure adequacy of illumination.
    - (ii) While making such survey, the measurement of lighting shall also be taken at the point farthest from the source of light lying within the limit of the work place or in haul road or travelling or haulage roadway, as the case may be.

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(iii) A record of every such survey shall be maintained and signed by the competent person making the survey and countersigned and dated by the manager.

11. Illumination Plan:

(i) The manager of every mine shall ensure that an Illumination Plan, indicating the location of places, type of illuminating devices, fixtures, lamps, supports, any other devices for illumination and showing required as well as measured value of light at various places to be illuminated, is maintained. Where any area of the mine is not in use or not needed to be lighted, the same shall be clearly marked and demarcated on the plan with reasons to be recorded. The plan shall be kept signed and dated by the surveyor and the official authorized for maintaining the lighting standard and countersigned and dated by the manager.

(ii) The Illumination Plan shall be brought up to date in every month based on the monthly illumination survey and considering the current status of workings.

[File No Z-20041/01/2017/S&T(HQ)]

Prasanta Kumar Sarkar, Chief Inspector of Mines

This Circular supersedes all the earlier issued Circulars on Standards of illumination in opencast coal mines.

06\11\17

(Prasanta Kumar Sarkar)
Director General of Mines Safety